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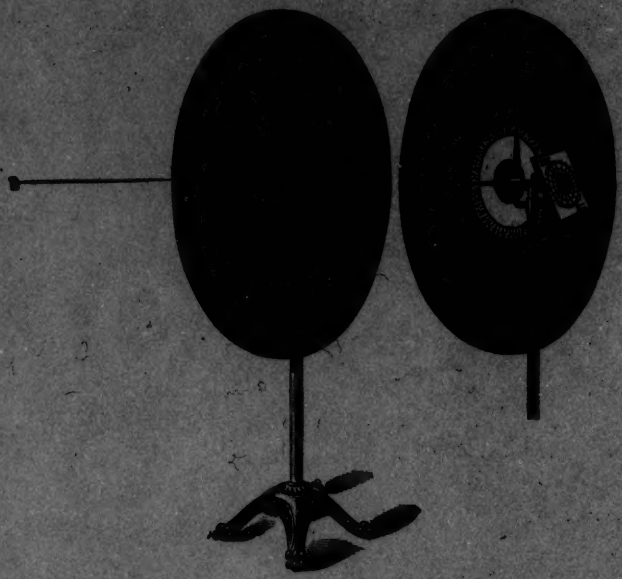

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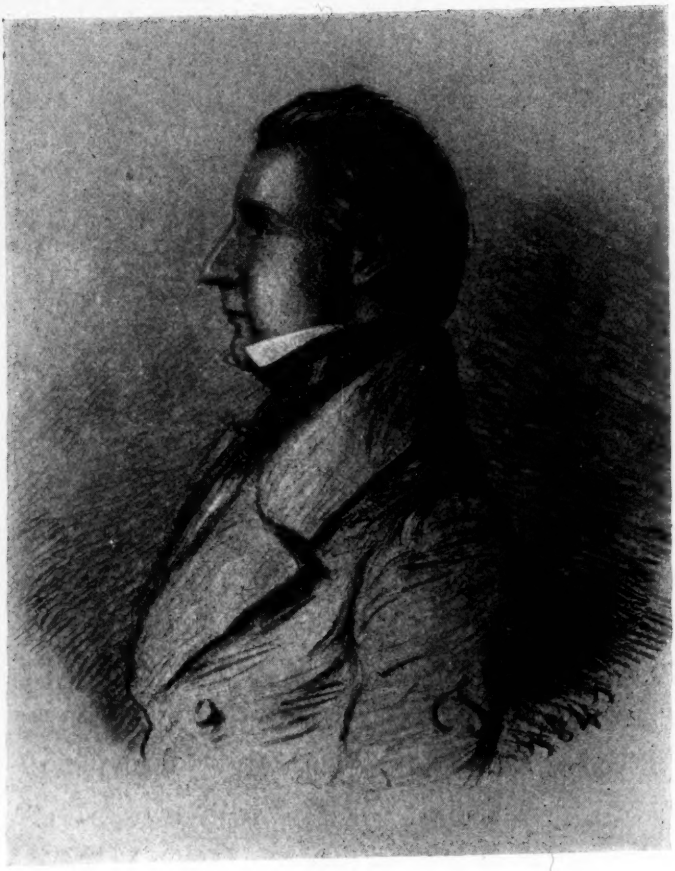

FREDERICK TYRRELL
(1793-1843)

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BRITISH MASTERS OF OPHTHALMOLOGY SERIES

8.—FREDERICK TYRRELL
(1793—1843)

BY
FRANCIS ASTLEY COOPER TYRRELL, F.R.C.S.

FREDERICK TYRRELL was born on December 30, 1793, at the Guildhall. His father, Timothy Tyrrell, held the post of City Remembrancer. Frederick was one of fourteen children, four of whom died in infancy and were buried in the old church of St. Lawrence Jewry which stands within the precincts of the Guildhall. John, the eldest, practised as a barrister and served on the committee of the Royal London Ophthalmic Hospital, George, the second son, entered the Navy and retired with the rank of captain. Edward, born the year before Frederick, stepped into his father's civic shoes and held the office of City Remembrancer for thirty-six years. Only one of the other children reached any position of great distinction: William, the youngest. He became Bishop of Newcastle, Australia, and left his name on the map, Lake Tyrrell, Victoria, being named after him.

Frederick Tyrrell lived with his parents at the Guildhall till 1804, in which year they took a house at Kew, facing the Green, with a garden running down to the river. The house still stands, although much altered. A narrow lane at the side leading to a small dock is known to the older inhabitants as Tyrrell's Lane. Tyrrell was

educated at Reading under Dr. Valpy, and, on leaving school, was apprenticed to Mr. Astley Cooper, for the usual period of six years. He afterwards went to Edinburgh to complete his medical studies. In 1815, shortly after the Battle of Waterloo, he served in the Military Hospital at Brussels for a brief period. He then started to practise his profession at 26, New Bridge Street, Blackfriars. He was married shortly afterwards to Miss Frances Susannah Cooper, sister of Bransby Cooper, the nephew and biographer of Sir Astley. In 1822 he succeeded Mr. Chandler on the staff of St. Thomas's Hospital. He also succeeded Mr. Travers on the staff of the London Infirmary for Curing Diseases of the Eye, thus becoming the colleague of Lawrence. This Hospital was removed in 1822 from its old quarters in Charterhouse Square to Blomfield Street, Moorfields, and was then known as the Royal Ophthalmic Infirmary.

In the following years he extended his labours to other fields by becoming Professor of Anatomy and Surgery at the Royal College of Surgeons and teaching at the Aldersgate School. He remained on the staff of the Royal London Ophthalmic Hospital, as it had once more been rechristened, until 1843, a period of 26 years. He died suddenly, on May 23, 1843, in his fiftieth year, after hurrying up some stairs to bid at an auction. He left a widow and seven children, one of whom, Walter Tyrrell, surgeon, was the father of the writer of this biography.

In 1840 Tyrrell published his book on diseases of the eye in two volumes, dedicated to his ophthalmic pupils. This work gives a good account of the clinical methods in use at that time, and is illustrated by excellent coloured plates. His interests were obviously more in the clinical side of his work. His account of his first cataract operation is of some interest as showing how his mind was swayed against the violent antiphlogistic methods of excessive bleeding and purgation prevalent at the time. He says, "When I became surgeon to the Hospital the usual practice was to take blood from the patients submitted to the operation of extraction in the evening after the operation; the first patient, a female, from whom I extracted a cataract, was bled in the evening according to the ordinary practice; after the loss of a few ounces of blood, the patient became faint, felt sick, after a few minutes vomited violently, and during the act of vomiting, the vitreous humour was ejected through the section in the cornea in so large a quantity as to destroy the eye. My operation having been performed as I wished, I was much annoyed by this untoward result, yet it gave me a useful lesson; I did not again allow a patient to be treated on the same plan."

The notes of his cases, now in the possession of the author, deal largely with the external diseases of the eye. The remedies of leeching, venesection, and purgation predominate, as they did in all

the clinical work of this period; but the fact that he was less drastic than others in his application of them, must be put down to his credit. His belief in nourishing, rather than lowering, the vitality of his patients, is evident in all his later writings. That he was by no means at first completely won over to the other side is shown by his report of the case of a man of the name of Death, who was admitted into the Hospital with purulent ophthalmia. He says, "I directed bleeding from the arm till the patient fainted; and, as his bowels had been freely acted upon, I prescribed a solution of tartar emetic, of which he was to take a dose containing a quarter of a grain every quarter of an hour, till he became nauseated, after which the dose was to be repeated whenever the nausea appeared to be subsiding; further, he was to take two grains of calomel and half a grain of opium every six hours, and he was furnished with three dozen of leeches, with directions to apply twenty round the left eye if he experienced a return of pain or uneasiness. I visited him about ten o'clock at night, and found that all my directions had been carefully attended to; he had been kept in a state of nausea, and thirty leeches had been applied round the left eye, on the palpebræ and cheek, but he still complained of much local pain. He had lost near thirty ounces of blood from the general bleeding, and several ounces more from the application of the leeches, yet I thought it necessary to take away a further quantity, there being evidence of acute local action. I therefore bled him again from the arm till he fainted, which he did after he had lost eight ounces of blood." He goes on to say that the poor fellow took several months to recover from the severe depletory treatment. The final result of the case was not a happy one.

Tyrrell's reputation as an ophthalmic surgeon rests chiefly on his operation for artificial pupil. It is recorded in a notice, after his death, in the archives of the Royal London Ophthalmic Hospital for 1843, that he was specially to be remembered for his success in this field.

The following is his own account of the method in which the operation was performed. "The patient should be placed as if about to undergo an operation for cataract. The broad needle should then be passed through the cornea, close to its junction with the sclerotic, and at that part of its margin which corresponds to the interval between the depressor and abductor muscles. In pressing the needle through the cornea, one flat surface should be parallel to the surface of the iris, and the other, of course, directed forwards—the instrument should be made fairly to penetrate the the anterior chamber of the eye, but should be kept quite free of the iris; it should not be passed so far as the pupil. The puncture of the cornea usually admits of the escape of some portion of the aqueous humour; but if it be carefully made, a very small portion of the fluid only exudes: and it is advantageous to retain such a

quantity that the hook may be carried into the anterior chamber without risk of entanglement in the iris.

The hook should be passed with the bent limb towards the cornea, or forward; and then it should be carried as far as the aperture of the pupil; and the extremity of the instrument being introduced through the pupillary space, the bent part of the hook should be directed backward, by half rotating the handle of that instrument between the finger and thumb. The pupillary margin of the iris should next be caught by the hook, by pressing the point gently towards the surface of the lens, at the same time that the instrument is carefully withdrawn. When, however, the bent part of the instrument is withdrawn, as far as the opening in the cornea, its passage will be generally impeded, whilst the point is directed backwards, as when catching the margin of the iris. It is then again necessary to half rotate the handle, so as to direct the bent limb forwards; but in doing this, the instrument must not be allowed to recede from the opening in the cornea, or the iris may slip from the hook. The hook being directed forwards, and still retaining a hold of the pupillary margin of the iris, should then be withdrawn through the corneal puncture, bringing with it part of the iris; and sufficient of the membrane should be drawn through the opening in the cornea, to effect the desired change in the position of the pupillary aperture of the iris.

The pupil, of course, loses its circular figure, and becomes pear-shaped, and narrowest immediately in connection with the puncture in the cornea.

The piece of the iris drawn through the opening in the cornea may be cut off by a fine pair of scissors, or left to separate by ulceration. I usually cut it off, as it lessens the after irritation of the organ."

He makes no mention of sympathetic ophthalmia occurring, but this was evidently not recognized as such at this time.

Bowman states in the *Medical Times and Gazette*, January 3, 1852, that the operation as modified by Tyrrell was almost exclusively practised in cases of corneal opacity at Moorfields Hospital at that time. Bowman introduced a further modification, using what he called a needle hook, of about the same size as Tyrrell's hook but with a sharpened flat end at the bend. This was thrust through the cornea without any preliminary incision, and the iris pulled through the incision. The advantage he claimed for this method was the retention of the aqueous throughout the operation.

COMMUNICATIONS

REMARKS SUGGESTED BY DR. GORDON HOLMES'S PAPER, "DISTURBANCES OF VISUAL ORIENTATION"

BY

SIR GEORGE A. BERRY, LL.D.

MAJOR, R.A.M.C., T.

I FEEL that some apology is due for venturing to comment upon cases which one has not oneself observed. Dr. Holmes's cases are, however, recorded with so much perspicuity and discrimination that one's confidence in the accuracy of his observations is at least as complete as if the opportunity of making them had occurred to oneself. They are, moreover, in the highest degree interesting and suggestive.

An analysis of the conditions described indicates that the function of vision in so far as central visual acuteness goes was, in some cases at least, unimpaired ; that the reflex pupillary mechanism was not interfered with and that colour vision and stereoscopic vision were normal. In short, the lesions caused no defect in central (or foveal) vision. Even projection in the case of foveal images was apparently not essentially different from normal though the normal facility of bringing the retinal image of any object engaging attention on to the fovea was more or less conspicuously absent. When to this is added the fact that, so far as is stated, peripheral visual acuteness and peripheral colour vision did not show any abnormality, one may conclude that *cone* vision and *cone* reflexes were not disturbed by the lesions which caused the interesting complex of symptoms. Yet all these symptoms were indicative of very serious impairment of visual functions.

One question which suggests itself is : Can the symptoms be ascribed to the more or less complete damage done to cortical areas, directly associated with, but anatomically separated from, the visual centres ? Without taking into consideration the most prominently characteristic class of symptoms, viz., what he so well summarises as "disturbances of orientation and localisation by sight, inability to estimate absolute and relative distances and failure to recognize relative lengths and sizes," there are observations recorded, the explanation of which may, no doubt, be found in cortical damage. For instance, visual retentiveness was found in one case to be very defective.

On the other hand, many of the facts elicited by the subjective examination of the cases appear to point less to central than to more

sub-cortical lesions, though both may have contributed in different degrees in the different cases to the functional impairments which they revealed.

Normal projection is characterised by the following: (1) A central image, on uniocular fixation, is projected along a line which passes from the object to the eye to meet and thus to form a continuation of the axis of vision. (2) On binocular fixation, the projected central images of the two eyes are superimposed, whether the two foveal images are those of the same or different objects and therefore whether the eye axes are parallel, convergent, or divergent. (3) This projection takes place along a line which meets, somewhere, usually at its midpoint, the line joining the centres of rotation of the two eyes. (4) A peripheral retinal image is projected in the direction of the line which passes from its object to the eye, i.e., it has an angular separation from the axis of vision equal to that of the change of direction which would be required to bring the fovea to bear upon the object. When the image of any eccentric object falls to the right or left of the retina of each eye or above or below, it is seen singly. The images are then said to occupy "identical" points on the two retinae. The identity is only strictly true for objects at a great distance or for objects lying on what is called the horopter. The theory of identical points need not, however, be considered here. It is of no practical importance.

The point of physiological importance is that for the accurate central fixation of an eccentric object both eyes have to move in response to an innervation which is always equally distributed over the two eyes, whether or not the change in the directions of their axes which this calls for, is of exactly the same angular amount. And the change in direction is effected with ease and rapidity and without giving rise to the appearance of movement of any objects in the field of fixation.

When an external object forms its image to the right of the fovea in one eye and to the left of the fovea of the other eye the objects appear double. Except where the images happen to be too eccentric the object can be fixed binocularly. This also takes place in response to an equally distributed innervation over both eyes and again also whether the angular change in the direction of fixation in each eye is the same, or different.

Now, while central projection, pathologically, actually, and physiologically (under certain conditions) apparently, can be faulty, or in other words fail to correspond to the laws of normal projection, peripheral projection, relatively to central projection, remains invariable. That is to say that whether or not the central projection is true, the projection of peripheral images maintains the same angular relationship to the foveal projection.

It is not difficult to show that the faulty projection which

characterises an oculo-motor paresis is entirely comparable to normal projection in that it is proportionate to the effort made to alter the line of fixation, And the same is true with respect to uniocular physiological faulty projection (vide *Edin. Med. Jl.*, June, 1913).

Projection takes place therefore in strict accordance with the degree of innervation which is required to alter the lines of fixation. Any departure from the normal effort of innervation required for this affects projection. Normally, therefore, projection comes to correspond, accurately and consistently, with the position of the eyes; and this relationship is established by the normal degrees of innervation habitually called for to effect fixation, whether in like directed excursions or in convergence of the axes of vision.

If it were not for the existence, under pathological conditions, of faulty projection it would be difficult to recognize the factor of innervation as the basis of normal projection.

Another class of cases which show, not only the influence of innervation, but also that the normal associations between the line of projection and the axis of vision may be lost, is met with in long standing strabismus. Operation in case of convergent stabismus for instance, whether by tenotomy or advancement or both combined, occasionally gives rise to diplopia where none existed before operation. The diplopia, however, is often not in accordance with the relative positions of the two eyes. Thus, although some convergence may still remain after operation, the patient will be found to have crossed diplopia. His previous projection had, therefore, come to be one which corresponded to parallelism of the axes instead of to convergence, and consequently the operative diminution in the degree of convergence has had the same effect as if the axes were actually now divergent. The same phenomena are presented, *mutatis mutandis*, after advancement for divergent strabismus.

We must, therefore, recognize, in connection with the movements of the eyes to effect fixation of any object, a sense (unconscious, no doubt) of the effort required to do so. This I have always referred to as the sense of innervation (vide *Edin. Med. Jl.*, June, 1913).

But, although the visual impression resulting from the retinal image of any external object elicits consciousness of the presence of that object it apparently does not necessarily at the same time cause the consciousness of its position in space. This, I think, may be inferred from the phenomena exhibited by Dr. Holmes's cases. In them the sense of innervation seems to have been impaired or abrogated. Dr. Holmes seems to ascribe this to a "disturbance of visual attention." But even when attention was directed to eccentric objects his patients were unable to fix, or had great difficulty in fixing them, in addition to having little or no clear notion as to their positions in space.

It is no doubt the same sense of nerve effort required to pass from the fixation of one point in space to another that creates the consciousness of the shape and size of an object whose image does not lie wholly on the fovea. No doubt such a process as determining the midpoint of a line, or the centre of a circle, can be done with the maximum degree of accuracy by "running the eye" over the different parts of these figures. A very great and quite astonishing degree of accuracy can, however, be found to exist without any change in the position of the eyes. The effort need in fact not be made, and yet there is a consciousness of what the effort would have to be, a sense of what changes of innervation would be called for.

The sense of innervation in the sphere of function of the oculo-motor muscles is in fact closely allied to the so-called muscular sense of the skeletal muscles. In some respects they are different, particularly in regard to the end-organs in each case which in the one are in the retina and in the other in the muscle itself. Intramuscular end-organs would indeed serve no useful purpose in the case of an oculo-motor muscle. In many respects they are similar. Not only are we conscious of the effort required to bring the muscles into the state of activity required for the performance of a definite action, but we can gauge accurately what would be the effort required for the same action without making it. Both for the innervation sense and the muscular sense, in this potential form, habit is no doubt what establishes their accuracy and perfection.

It is interesting, therefore, to note that, in some, at least, of the cases recorded there was apraxia. Further, the relatively smaller interference with habitual movements was well exemplified. For instance, movements to order were executed with greater difficulty than walking or conveying food on a fork to the mouth. The explanation of this is, no doubt, that the more firmly a habit, whether good or bad, is established, the more is the innervation called for capable of becoming independent of a higher control. The effect of habit is indeed very well seen in different eye movements (vide *Edin. Med. Jl.*, November, 1912.)

In one case in which there was no apraxia the patient could move his eyes in convergence when his own finger was approximated to his eyes, but was unable to do so in order to fix any external object brought close to the eyes. Presumably this would also have been found possible if the patient's own finger had been passively approached to his eyes. This is not stated, but may probably be inferred from the observation that the passive jerking of his own hand towards his eyes caused blinking, which was otherwise not elicited. Something, therefore, in addition to the retinal impressions, whose position the patient became conscious of through

another sense than sight, was necessary to evoke the responses which would normally be got through ocular impressions alone. Convergence, however, on his own finger, though it occurred, did not do so constantly. But this does not detract from the significance of the phenomenon, as even under normal conditions it is not easy to converge on one's finger without seeing it.

Two other points which characterized the cases recorded call for consideration, viz: the absence of blinking and the want of appreciation of the movement of objects lying outside the line of vision. They are perhaps more difficult to explain. Obviously we have to deal, as regards the first, with the abolition of a reflex. Reflex blinking was observed to be absent in all the cases except one, with regard to which no reference is made to this point. Of this one particular case, moreover, it is stated that "the disturbances of visual orientation were slighter than in the others, and they diminished considerably while he was under observation." It is possible, therefore, that the loss of this reflex may not have occurred in this case. Yet it is unfortunate that the record of the case does not clear this up. One would expect, in view of the similarity exhibited otherwise in the symptoms, and because of the absence of reflex blinking, in the other case which is stated to have improved while under observation, that reflex blinking must have been absent or impaired in this case as well.

The reflex mechanism which leads to blinking is therefore found to be defective, some part of its entity being interfered with by the same lesions which cause the defects in orientation and localization. That is to say that the peripheral retinal impressions which, though perceived, do not admit of being transferred by appropriate eye movements to the foveae, are also prevented in some way from eliciting the involuntary protecting closure of the lids.

This suggests that the fixation movements of the eyes are, to some extent at least, also reflex in their character. Certain it is that while there is no difficulty in moving the eyes in similarly directed association without the stimulus of different objects on which to direct them, convergent movements can only readily take place when they are induced by the stimuli of hetero-lateral retinal impressions. Thus we find that in some of Dr. Holmes's cases it is stated that all the movements of the eyes were normal except convergence.

With the evidence indicative of an intact connection of the peripheral cones, viz.: unimpaired vision and colour vision and pupillary reflex, it seems not an unreasonable assumption to make that the end-organs for the orientation and localization reflex are the retinal rods. There is good reason for believing that the rods are not colour-sense end-organs, and some reason for assuming that they play only a subordinate part, if any, in connection with the

form-sense. On the other hand, the normally acute sense of movement at the periphery of the field of vision, when compared with that of the peripheral form-sense, is suggestive of the rods being end-organs for movement. And the sense of movement is evidently closely allied to that of orientation and localization. It is interesting to note in this connection that, in three of the cases, an inability to recognize the movements of peripherally placed objects was observed.

In regard to another function with which there is sufficiently good reason to associate the rods, viz: retinal adaptation, there is no reference in Dr. Holmes's paper from which any concluson as to the integrity of this function could be arrived at. It is unfortunate that no examination of the light-sense seems to have been made, although the observations are otherwise so complete and so discriminating.

I have long held the view, arrived at from purely speculative considerations, that the rods might possibly be orientation end-organs (vide *Ophthal. Review*, Vol. IX, 1890, pp. 136-139). I have consequently been on the look-out for any evidence pointing in this direction. The symptoms which Dr. Holmes has elicited in the cases described in his paper appear to do so. In any case they very clearly demonstrate that lesions causing hemianopia, the site of which is well known, do not cause orientation defects. A particularly beautiful illustration of this occurred in his third case, in which there was a temporary left hemianopia and in which "when vision to the left of the fixation point had recovered, it was observed that he could localize the position of objects in space better to this side, which had been blind, than to his right."

Notwithstanding the fact that in most of the cases the difficulty of making convergent movements in the interest of fixation is referred to, there is no note of diplopia having been complained of. Presumably it was not a symptom that spontaneously obtruded itself on the attention of the patients. It is not stated if any attempts were made to elicit it.

It does not seem improbable that the greater or less impairment of the sense of orientation would at the same time cause an absence of the symptom of diplopia. This point should, however, receive consideration in other similar cases which may be observed now that attention has been called to traumatic orientation defects.

Another point which may be briefly referred to is the question as to the presumable infrequency of orientation defects.

Although in my service at the Second Scottish General Hospital I have seen many cases of hemianopia from war wounds in which all degrees and complexities have been represented, I have never observed any which were complicated by even a trace of the symptoms indicative of orientation defects. I conclude from this

that they cannot be a frequent accompaniment of traumatic hemianopia.

On the other hand, these symptoms may quite well have been missed in other cases which have caused impairments other than distinctively visual ones, and such cases do not to any extent come within the purview of the ophthalmic surgeon. Orientation defects may quite well be less infrequent than the absence of recorded cases hitherto would suggest. That remains to be seen. But granting that they are infrequent, and this I think is most likely, it is possible that a cause for this may be found in the orientation centres and their direct connections, which must surely be represented on both sides of the brain, being, unlike the visual centres, intimately interrelated, so that one alone may suffice to carry on the function when the other has been thrown out of gear. This possibility, which was suggested to me by a distinguished neurologist, is supported by the fact that there was not shown to be any markedly one-sided character in the orientation difficulties in any of Dr. Holmes's cases, unless the observation to which I have already referred, where orientation appeared to be less imperfect in the area of a recovered hemianopia than in the opposite half of the field of vision, can be taken as indicating that there may be exceptions to this rule. In any case, this is another point which future observations may clear up.

I make no attempt at suggesting a localization of the lesion which leads to the particularly interesting functional interferences discovered by Dr. Holmes. I do not even offer any explanation as to whether the symptoms point to a cortical or a sub-cortical interference with the orientation reflex, or to both. In some cases one would suppose that the cortex was not involved or was not the main area whose function was disturbed, but I do not feel that my knowledge of cerebral anatomy is sufficiently intimate to analyse this aspect of the matter. My main object has been to attempt to trace a connection between localization and cognate disorders, and reflexes which it is suggested have their normal starting point from the retinal rods.

In the October number of this journal, Dr. Holmes concludes his paper with a fuller analysis of the cases and a discussion of the position of the lesions which may be held to cause orientation defects.

The above comments on the cases themselves were made without further knowledge of Dr. Holmes's views than could be gathered from the first portion of his article, and were in the hands of the Editor before the concluding portion appeared. A few explanatory supplementary remarks are suggested by the views expressed by Dr. Holmes.

The only material way in which his views seem to me to differ from my own, lies in his apparent adherence, to some extent, to the old "nativistic" conceptions regarding certain ocular phenomena. He says: "We know that as a result of certain cerebral lesions the locality of a tactile stimulus can no longer be recognized, though there may be no affection of either the threshold of sensibility or the quality of the sensations evoked; the local signs of the cutaneous surface then no longer furnish the necessary information to consciousness. Similarly, the cerebral wounds in these cases affected the local sign functions of the retinae, and the patients consequently became unable to project correctly, and arrange in their proper relations in space, the images which excited vision, and to recognize the actual spatial relations of objects seen and their respective sizes and lengths." Unless what he here calls "the local sign" arouses consciousness in dissimilar ways in the two cases, the analogy is complete. It appears, therefore, somewhat enigmatical that Dr. Holmes should seem to infer that a radical distinction is called for to explain, on the one hand, disturbances which take place in bidimensional space, and, on the other, in space of three dimensions. He says: "In discussing these errors we can conveniently, on physiological grounds, deal separately with those made in the coronal plane, and those due to disturbance of the perception of distance." And the reason for doing so appears in a subsequent sentence: "But retinal stimuli alone suggest only the magnitudes and the relative positions of objects in a bidimensional plane. To obtain a correct knowledge of the locality of the objects in relation to ourselves, afferent impressions from the ocular and neck muscles and tendons, which can inform us of the direction of the visual axes and the position of our heads, are also necessary." Surely both are equally referable to a stimulus conveyed to (presumably) the angular gyrus, and started by a retinal image. A similar distinction is also drawn between inability to appreciate the absolute and the relative positions of objects. It is difficult to see why the one should not necessarily entail the other.

When Dr. Holmes talks about impulses from the oculo-motor muscles, as being provided by extra-retinal afferents, he obviously has in view something in connection with the muscles which he supposes exists apart from the retinal stimuli. But it has to be remembered that it is impossible with closed lids to tell for certain what is the position of the eyes. No doubt it is possible, without fixing any object, to rotate the eyes in the same direction, but apart from the consciousness of making this voluntary movement, there is no consciousness of the exact position of the eyes. Convergent movements, if possible at all under similar conditions, evoke no consciousness of convergence.

As the matter appears to me, the afferent path in all cases starts

from some retinal end-organ, and the impulse which thus results in, let us say, the angular gyrus, produces in some way a consciousness of the position of the object whose image falls on a particular part of the retina. A lesion occurring at any part of this afferent tract, or involving the angular gyrus itself, must therefore impair orientation. When the heteronymous images on the two retinae, which normally induce either an active or a potential convergence, fail to do so, one of the chief factors which contribute to the sense of distance, in the case at least of objects which are not far removed from the eye, is lost. If the lesion does not happen to be central, but only involves some sub-cortical portion of the afferent tract, it must still remain possible to converge on an object, whose distance is more or less correctly appreciated otherwise than through its retinal image, e.g., the patient's own finger. In this connection the following observation by Dr. Holmes is interesting: "Though Case 4 accommodated for his own finger accurately, and Case 2 could do so occasionally though not constantly, the other cases in which the test was made failed even when, as under such conditions, they were aware of the nearness of the object."

Dr. Holmes shows some tendency to mix up convergence and accommodation. It is certainly only convergence or the sense of convergence innervation which has any bearing upon distance estimation. It would be extremely disturbing if a hypermetrope or a myope were to judge distance differently when looking at objects with and without his optical correction. On the other hand, prisms which call for greater or less convergence than corresponds to the distance of an object looked at, alter the apparent size, and, more or less consciously, the apparent distance of the object.

I am the less able to understand how Dr. Holmes arrives at the views on which I have commented, as he very clearly states, in referring to the angular gyrus: "It may be consequently assumed that one function of this part of the brain is the reflex adjustments of the eyes to peripheral stimuli, or the co-ordination and integration of the afferent impressions which, through these efferent centres, evoke appropriate ocular movements in response to retinal excitation."

I have some difficulty also in accepting Dr. Holmes's view that the behaviour of his patients indicated "a local disturbance of visual attention." There may, no doubt, have been evidence of some general slackness of attention. But I see no reason to ascribe the symptoms which indicated a local disturbance of attention to anything else but the orientation difficulties. These difficulties might surely explain why: "attention lacked its normal spontaneity and facility in directing itself to new objects." Even normally, peripheral objects are to a great extent unnoticed unless attention is directed to them, when, so far as their localization goes, that is

always perfect, even if no direct fixation of them is made. That this is so is evident from it being possible rapidly to alter the line of fixation so as to bear accurately upon them without any preliminary searching movement. I do not suggest that "visual inattention" is to be regarded as never having any pathological significance, merely that this is an unnecessary assumption where orientation defects exist. Dr. Holmes states in fact that: "visual inattention often occurs as a unilateral phenomenon as a result of parietal and lateral occipital injuries when spatial orientation is not affected." If, as Dr. Holmes infers, visual inattention is to be accorded a place in the symptom-complex of orientation disturbance, this fact may be looked upon as suggestive of the possible close interdependence of the orientation centres on the two sides of the brain to which I have referred above.

With most of the other valuable comments which Dr. Holmes makes in his analysis of the symptoms presented by his cases, I find my own views in more or less complete accordance. One of his points deserves, I think, more prominence than he gives it. He explains the fact that reading was generally less difficult than might have been expected from the inability that there was to count objects in the field of vision, by noting that: "the appropriate movements of the eyes from left to right, which had been acquired by long training and fixed by habit, were less affected than their voluntary deviations to objects that were at the moment outside central vision." There can be little doubt that in acquired orientation defects, "habit" must have a modifying effect on the functional impairment as it has in other disturbances implicating the oculo-motor muscles. Its effect is noticeable, e.g., in the increase in the area of diplopia on downward fixation in abducens paresis. I have pointed out too (vide *Trans. Ophth. Soc.*, 1901) that in the peculiar, not altogether rare, condition of convergence spasm, the circumstance that the convergence, though always in excess of binocular fixation, is diminished to either side of the field of fixation, is due to the persistence of the habit established by the necessity, when reading, of maintaining fixation of words on a plane near to and parallel with the eyes. When this subtle variation of convergent effort can assert itself under conditions which interfere with reading, it is not difficult to understand that running the eyes along a printed line should be possible even when localization and orientation are seriously impaired.

The concluding paragraph of Dr. Holmes's communication is as follows: "The angular gyri contain centres from which the movements of the eyes can be elicited, and it may be to damage of these portions of the cortex that the disturbance of ocular fixation, the failure to accommodate near objects, and the absence of the blinking reflex were due, in so far as they were not a direct result of the

defective recognition of the position of the object in space, and especially of its distance." The cases show, I think, that the statement would be more complete if after "damage of these portions of the cortex" there were added, "or of their afferent fibre connections from the retinal end-organs."

The last clause of the paragraph I have quoted seems to indicate that Dr. Holmes assumes there is some other independent cortical centre which has to do with the recognition of the positions of objects in space. This may be so; yet if the potential response of the eye-movements centre is interfered with, either by lesion of the centre itself or of the afferent path associated with that centre, this would surely be enough to account for the symptoms. In cases of oculo-motor paralysis, although projection may be faulty, there is no change in the relative localization of external objects. This is evidently because the voluntary oculo-motor centre with its afferent tract are not involved in the lesion causing the paralysis. The reflex and voluntary innervations are normal, but the response to efferent stimuli is defective. Consequently, projection is no longer in accordance with the position of the eye, as from established habit it normally is.

JOTTINGS ON LOCAL ANAESTHESIA IN OPHTHALMIC SURGERY*

BY

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I WAS suddenly summoned by telephone by a Suffolk doctor to go over and see a patient with exophthalmic goitre, whose left eye had become seriously affected; if I found it necessary to remove it, what preparation for the anaesthetic should I like? I replied I would come and remove the eye if necessary and that no preparation for an anaesthetic was necessary. I went; a glance was sufficient to condemn the globe, and with perfect ease and freedom from pain I proceeded to remove it under local anaesthesia. The doctor concerned, an able man, told me he had thought it necessary to remove the eye during my absence and was prepared to do it; in fact, he had called in a colleague to give a general anaesthetic for the purpose, but the colleague was so concerned at the patient's condition that he declined to administer any such, and she was left for my return.

A few weeks later I saw for a colleague a woman with a good-

* Read at the Oxford Ophthalmological Congress, July, 1917.

sized melanotic sarcoma in the ciliary region and removed the globe under local anaesthesia the following evening.

Quite recently, on the couch in my consulting room, I did an iridectomy under local anaesthesia for acute glaucoma of both eyes —not at the same sitting, as the attacks did not synchronize—the patient walked and "trammed" home; and about the same time I did an iridectomy by the same method on a London patient for increased tension with a nearly closed pupil, and on my consulting room couch I excised a lacrymal sac by its aid. These are but a few examples. For ordinary cataract extractions, Elliot's trephining, squint advancements and tenotomies, optical and preliminary iridectomies—the latter of which I am now convinced is in most cases a mistake, for I consider the simple extraction far and away the best one—I find the ordinary instillation of 2 per cent. cocain into the conjunctival sac with a little adrenalin quite sufficient.

I am now quite sure of the boon local anaesthesia is to us all, and especially to anyone situated like myself, and with a fairly large *clientèle* amongst all sorts and conditions, rich and poor, for I have never held any hospital appointment in the County of Norfolk, and have all along been handicapped in the operative treatment of our poorer brethren. I hold that every medical man, according to his lights, should do what he can for the less well off, and, failing to get an appointment many years ago at the Norwich Eye Infirmary, I had to have recourse to other ways and means and took to seeing out-patients at my own house at an early hour every week-day morning, the result being that I very soon had a large attendance at that time; with this came the difficulty of doing and dealing with the operations necessarily often involved.

Operating on these patients in their own homes presented many difficulties. Some of the furniture required removal, the geraniums had to be cleared away from the window sill and other treasures from the table in the middle of the room. There was generally a couch on the premises, if not in the parlour, in some other room, but it was not always quite handy for the left eye and vice versa—the back would stick up in an awkward way; then, in spite of the removal of the geraniums, the light was not always quite nice, and the sun would at times annoyingly set on the wrong side. Moreover, the antiseptic arrangements were not always above suspicion.

I began to wonder if these cases could not be done at my own house, and gradually took to doing them there, and now for many years I have done excisions, removals of sacs, all sorts of squint operations, cataracts, and iridectomies, etc., five, six, or seven of an afternoon, on my consulting room couch, some of the extractions being simple ones, the patients getting up and walking home a mile or so afterwards, and not once have I had any complication of any kind whatever as a result thereof. Think what a gain that was to me:

a perfect north light, with the electric light handy in case daylight was insufficient, and all the antiseptic, etc., measures under my own control. But one thing was wanting, viz., the difficulty I had to contend with in excision of an eye and cases of acute and subacute glaucoma, etc., etc., too painful to do as a rule under the ordinary method of local anaesthesia. It was awkward and expensive getting in another medical man to give a general anaesthetic. Sometimes, I admit, I gave it myself and did the operation too, and there was the risk of patients being sick in my room ; then they had to be kept an hour or so before I liked to send them home, and frequently the expense of a cab was necessary. So, as I regularly—many years ago—took to excising lacrymal sacs under injections of novocaine cum suprarenin borate, I began to wonder whether the same method could be used for excision of the globe, and one dark winter Sunday afternoon I had a poor fellow who crystallised the business and made me take the plunge, for to me it was quite new ground. I had never seen, heard, or read of a case, and almost fancy the method must have originated in my consulting room that day. It is true I had seen Mr. Couper, at Moorfields, excise eyes by repeated injections of cocain with repeated snips as he went on, but his plan appeared to me cruel and unsatisfactory, and never caught on. This poor chap had an absolutely impossible, dark, dismal, and dirty home up a yard in Norwich, his wife was stone blind of both eyes, and he had an attack of acute glaucoma, which I saw too late, and for which, to try to relieve his pain, I had done an unsuccessful iridectomy under the ordinary local anaesthesia. The eye was acutely congested and inflamed, horribly painful and tender, and about as bad an eye to experiment on as one could wish. I thought I would try to remove it under deep local anaesthesia and injected a solution of novocaine cum suprarenin borate well back towards the apex of the orbit, using a straight needle and going through the upper and lower lid, aiming at the tissues at the back of the eye. Then, after about 25 minutes waiting, I began, going very slowly and cautiously, avoiding any drag on the muscles during their division, and completing the operation without any pain. A firm bandage was applied and the patient walked home, so far as I can recollect—for it is a good many years ago—quite alone. If I could get that eye out painlessly by deep local anaesthesia, I could remove any eye without pain, and ever since I have been removing them in this way, but I soon found out that it was better to go through the conjunctiva with the needle at the inner and outer canthus, and, though for years I used a straight needle, I have recently got Messrs. Weiss to make me a couple of slightly curved and fine needles which I always use now —you can get round the globe better with them.

The greater includes the less, and I often thought of doing my

acute and subacute glaucomas in the same way, and probably should have come to this in time, but I was afraid that the needle moving about in an unknown way in the region of the optic and ciliary nerves and blood-vessels might do harm and imperil the result of the operation. It was entirely owing to George Pooley that I took the plunge ; all credit is due to him and the paper he read at this Congress some three years ago (*Ophthalmoscope*, 1914, p. 464).

With his experience added to my own I at once took to this method of anaesthesia in practically all cases needing it or a general anaesthetic, and I very seldom have the latter administered now. There are some points of detail to be mentioned. I used always to inject along the inner and outer side of the eye—I do that still for excision—but for other cases I only inject along the outer rectus, going well back and aiming at about the posterior pole of the eye and thus catching the ciliary nerves and perhaps the lenticular ganglion. About 20 minutes after the injection you can operate.

The globe is somewhat proptosed by the procedure and is quite fixed, the muscles, apparently, being rendered functionless. Another point—which rather upset me in my first case—to be noted is the decided dilatation of the pupil which in glaucoma is not desirable, so in such I use eserin rather liberally to obviate this.

Another point is not to put on a very tight pad and bandage, as striate keratitis—the result of pressure—may be marked if you do. I alway use tabloids of novocain cum suprarenin borate, two for an excision, one for other operations ; each tabloid is dissolved in about a cubic centimetre of boiled and hot water.* I have never used stovain or alypin, etc., and am quite satisfied ; the addition of suprarenin makes an operation almost bloodless.

When operating on the lacrymal sac I inject along the line of the skin incision and also a few drops as near the anterior ethmoidal foramen as I can judge, in order to catch the infra-trochlear branch of the nasal branch of the first division of the fifth nerve, which supplies the lacrymal sac. The patients go home quietly and have their usual meals and, if the eyes are secured properly, no harm results. As a first dressing I use a narrow, about $\frac{3}{4}$ of an inch wide, strip of thin silk, antiseptic, salicylic plaster, going from the forehead over the lids and on to the cheek—this they cannot get off—then a pad of wool, retained in position by a bandage in males and by three strips of Mead's plaster in females.

By this method of local anaesthesia you can do almost every operation on the eye and lids. I have never done an exenteration

*The tabloids made by the Saccharin Corporation, Ltd., contain 0·1 gramme of novocain and 0·00025 of suprarenin borate, and are very convenient ; boiling water and a tablespoon can always be obtained.

of the orbit by it, but I think I could; in fact, I hardly ever call in the services of a general anaesthetist.

To our old-fashioned notions I know all this seems rather horrible, and many of you will think my plans of procedure and campaign somewhat extreme; but, as John Hunter said, "don't think, but try."

Is one more liable to get intra-ocular choroidal haemorrhage, etc., by this method? Does the effort and exertion of walking home increase the risk? No, it does not; if anything it tends to reduce it by determining the blood to other parts and muscles called into action by the exercise. The cases of post-operation haemorrhage are due, of course, to a diseased condition of the blood-vessels unable to stand the rush of blood into them, and for the most part the bleeding comes on before the patient is off the table. Mr. Charles Higgens showed, at the Ophthalmological Society a good many years ago, three cases lost by haemorrhage following cataract extraction, and I had one in an only eye following iridectomy for acute glaucoma under a general anaesthetic years ago in a woman by no means a teetotaler.

Look at the advantages of the method: no assistant or nurse required; no preparations for general anaesthesia or vomiting and general disturbance following therefrom; no interference with the diet; no struggling as the patient "goes under," no coming round of the patient and sudden movement when least expected; no anxiety due to sudden cessation of heart's action or respiration with artificial respiration and the *mauvais quart d'heure* following. The one little inconvenience is the prick of the needle during the injection; the site thereof is, of course, cocainised, but some slight pain is caused; occasionally a little faintness is produced, which is relieved by a dose of sal volatile or spirits.

RING INFILTRATION OF THE CORNEA IN A CASE OF PURPURA WITH A DISCUSSION OF ITS PATHOGENESIS AND SOME GENERAL OBSERVATIONS ON THE DIFFERENT FORMS OF CORNEAL INFILTRATION*

BY

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Foreword

WHATEVER the incidence of ring infiltration or so-called ring abscess of the cornea after operations involving the introduction of

*Paper presented to the Oxford Ophthalmological Congress in July, 1917; written while the Author was Resident Surgeon to the Free Eye Hospital, Southampton.

instruments into the eye and especially after flap-extraction of cataract, may have been in the pre-aseptic days, judging from the scant notice taken of it by the older authors, and the seriousness of the condition, unless one is inclined to be uncharitable to them, one is obliged to think that it must have been even then, not a particularly frequent complication of perforating wounds of the globe in the widest sense of the term. Since the inauguration of the era of asepsis and antisepsis by Lister, it has certainly become a very rare occurrence after operations. So far as I am aware, since 1875—the year of publication of the first case of ring abscess—literature has record of only 20 cases, excluding the doubtful one of Hertel. Of these cases, 11 were of accidental wounds of the cornea caused by foreign bodies striking the eye—in one instance, recorded by Fuchs, the ring abscess occurring as a late infection taking its origin in an iris incarcerated in the sclera, as the result of an injury from a large needle three years previously; 4 occurred after cataract extraction, and the remaining 5 in the course of metastatic ophthalmia. None of the 11 cases of Fuchs, or the 4 cases of Collins were of metastatic origin. Every one of the 5 metastatic cases had a localized focus of sepsis in some part of the body or other. Weiss's case was in a patient suffering from complicated fracture of the femur. Hirschberg's patient was a man ailing from suppurative cystitis in addition to tabes dorsalis, etc. Herrenheiser's case and Wintersteiner's referred to by Fuchs, were in women suffering from puerperal septicaemia. Axenfeld's case was one of cryptogenetic pyaemia after cholelithiasis without liver abscess; the patient, a woman, presented endocarditis ulcerosa, meningitis suppurativa metastatica, and multiple abscesses in the substance of the brain as metastatic foci in addition to the eye. Of the 20 cases, 12 were in men and 8 in women. Out of the 12 cases in men, as many as 10 were due to accidental wounds of the cornea, and 2 of metastatic origin. Only 1 out of the 8 cases in women was due to accidental trauma, 4 resulted from wound infection after cataract extraction, and 3 accounted for by metastasis. This is just as one would expect in view of the greater exposure of men to the risk of foreign bodies, especially metallic ones, hitting the eye in the course of their occupation in steel, iron, and other metal works, the rarity of wound infection after operation—because of asepsis and antisepsis—and the peculiar liability of women to puerperal infection. The ages of the patients ranged from 23 to 70, the great majority being between 30 and 50.

From the above analysis it is evident that hitherto there has been no patient well within the teens in whom ring infiltration of the cornea has been reported, and no case of an acute general infection giving rise to the condition. Hence arises the special interest

of the following case which presents other noteworthy points perhaps best considered after the description of the facts.

Case

James Cole, 13 years of age, was admitted into the Free Eye Hospital, Southampton, on July 8, 1916. The history the mother of the patient gave was that a week previously, he returned from the swimming bath with a bad headache and was in bed for three days, during the first two of which he kept retching and had diarrhoea. He got up on the fourth day feeling better. He felt ill again on the fifth day and took to bed. The right eye got bad on the sixth day; the trouble started with severe pain in the eye. She bathed the eye with milk and water to start with, and later with boric lotion. Spots on the body started coming on the fourth and following days. He had measles and broncho-pneumonia as a child. He is said to have attended the swimming bath every day for three or four days preceding his illness, and the mother surmises that it may have been due to a chill he may have caught in the bath.

State on admission.—I found the patient pale and very much run down. Patches of purpura all over the body; warts on the left hand which he has had for a long time. L. E. normal.

R. E., strong diffuse injection of the globe. Surface of the cornea stippled. Pupil small and inactive. Iris congested. Exudate in pupillary area. There is a yellowish-grey ring of infiltration of the cornea about 2 mm. from the limbus. The central disc enclosed by the ring stands out, while the area between limbus and infiltration appears guttered. No red reflex. P.L. and projection present, T.n. Teeth in good condition. Patient said not to be subject to constipation. Locally, a 1 per cent. ointment of quinin and atropin and hot boric fomentations were prescribed. My notes during his stay in the hospital are as follows:

July 9.—The infiltration extends all over the cornea, though densest in the ring. Has had hardly any pain in the eye. Left elbow swollen and movement limited. No sponginess of gums and no bleeding from them. Good appetite. Slept well. Heart normal. Local application of tincture of iodine and hot boric fomentations for the elbow.

July 10.—The cornea presents a smoother surface and is less dull. Urine: acid, concentrated; sp. gr. 1014; sugar and albumin, nil.

July 11.—Bowels constipated. Mist. aperiens, ℥iss.

July 13.—Ring infiltration resolving. The ring much narrower and rarified. Rest of cornea clearer. Yellowish exudate projecting from the pupil. The cornea looks smaller. Though tension is not palpably lowered, the eye has a shrinking look.

July 14.—Tongue foul. Calomel gr. ¼ t.i.d.

July 15.—Ring infiltration further absorbed. But for a dot in the centre the exudate in pupil also absorbed. T.n.

July 16.—Just a trace of the ring obvious. No red reflex. Faint P.L. No projection. T.n. Patches of purpura desquamating.

July 21.—No trace of ring. The lens itself appears clear. Whatever prevents the red reflex is behind the lens. Just a faint haze of the cornea. *P.L. still present. T.—(?) Urine: faintly acid;* sp. gr. 1010; sugar and albumin, nil.

July 27.—Cornea clear. *A light yellow reflex from the back of* the lens. P.L. only at about 18 cm. Further away, light not perceived. No projection.

July 28.—Upper lid somewhat swollen. Eye tender. Superficial vessels growing over cornea at outer and lower quadrant. *Discharged.* Hydrarg. c̄ creta, gr. ii, t.i.d internally. Ung. atrop. 1 °/₀ t.i.d. locally. A temperature chart was maintained from *July 10 to July 25.* He ran a febrile temperature from July 10 to July 20, with a range of from 1° to 2° F.

August 8.—Seen in the out-patient department. Iris pushed forward. Yellow reflex from the back of the lens more striking. *No P.L. Eye again strongly injected and watering.*

August 11.—Because of its having become a soft blind eye which would not quiet down, the patient was re-admitted and the eye excised under general anaesthesia.

Macroscopic *pathological examination.*—The eye was cut open antero-posteriorly from the corneal limbus to the stump of the optic nerve. The eye *contained clear, watery fluid.* The retina was completely detached and shrivelled up behind the disc of plastic exudate overlying the back of the lens and the ciliary body in its entirety. The detachment was evidently due to the shrinking exudate pulling on the retina. The advancing of the iris and the extreme shallowing of the anterior chamber is accounted for partly by its being pushed forward along with the lens by the contracting plastic exudate behind, and partly by the cessation of formation of the aqueous, owing to the disorganization of the ciliary body and processes during the course of the inflammation.

Remarks

In this instance the purpura was characterised by lesions in the skin, swelling of one elbow with limitation of movement, and gastro-intestinal disturbances. This is a form of the disease affecting children, and known as "*Henoch's purpura.*" Whether or not this variety of the malady is particularly prone to involve the eye cannot obviously be decided on the strength of a single case. Seeing that there was no history of scarlet fever or rheumatic fever, that the heart and kidneys were normal, the teeth and gums were healthy, and there was no localized focus of sepsis discoverable elsewhere, it

is highly probable, if not certain, that the affection of the eye was a local manifestation of the general disease of the blood, and not a mere coincidence.

Here, as noted by previous observers, the annular infiltration was characterized by the rapidity of its formation, a complete, well-formed ring having occurred within 48 hours after the first manifestation of ocular symptoms. Unlike what is usual after ring infiltration of the cornea, in this instance the infiltration retrogressed completely. The eye did not go on to panophthalmitis with concomitant increase of tension, but became soft and shrunken owing to the cessation of formation of the aqueous, detachment of the retina, and disorganization of the vitreous and ciliary body in the course of the plastic iridocyclitis.

It may not be out of place here to discuss the pathogenesis of ring infiltration of the cornea in particular and incidentally of other forms of corneal infiltration in general. The first anatomical description of the condition was given by Fuchs in 1881 as the result of examination of the cornea of a diabetic woman aged 30 years. On the third day after linear extraction of cataract the ring abscess began to form, and four days later the whole cornea got sequestrated as a necrosed disc ; it permitted of being lifted off the sclera as if it had been divided with a knife along its border. The next anatomical description of the condition was by Collins in 1893. Collins says that he was first led to an examination of the cases and specimens, of which he gives the details, by the interesting theory of the pathogenesis of this condition given by Leber, and that he was exceedingly sorry to find that instead of supporting it, they offer serious objections to its acceptance. To quote Collins's summary of Leber's explanation of ring infiltration of the cornea : " He considers that when microbes are inoculated into the cornea, their action is not limited to the small area which they occupy, but that a kind of distant action takes place, due to the diffusion of irritating substances. In this way, what he terms a microbic area is formed around the seat of the wound. White blood corpuscles migrate from the vessels at the corneal margin and make their way towards the microbic area, without, however, quite reaching it, as it offers a resistance to their further advance. Thus a ring of infiltration is formed, the changes in the microbic area itself being simply necrotic in character. It follows that if this theory be true, we ought always to find the wound situated nearly in the centre of the ring of infiltration . . ." As in cases of ring infiltration of the cornea after perforating wounds, the situation of the annulus is invariable, whereas the situation of the wound is, oftener than not, anywhere but the centre of the ring, Collins thinks that Leber's theory is in conflict with the reality. He does not attempt to offer an explanation of the phenomenon himself. Fuchs refers

in his work to Collins's cases and contention, and in elucidation of the peculiar distribution of the infiltrating cells, says: "The ring abscess was designated as the immigration ring (*Einwanderungs-ring*).* In experiments on the cornea of the rabbit it lies in the form of a circle around the inoculated spot. In contradiction to it, the ring abscess in man by no means corresponds in its position with the position of the wound, which may even be outside the ring of pus. This is because it is not a ring of immigration to the corneal wound but to the necrotic cornea, and has therefore the same position wherever the wound may be situated . . . " Parsons shares Fuchs's view. Here it would be well to look into what Leber says: "Allow me for further explanation to describe to you a keratitis caused by inoculation of micro-organisms. Suppose the microbe has developed in the centre of the cornea, so as to occupy a certain area still remote from the corneal margin. The effect in the area directly attacked will consist only of regressive changes in the cells resulting in necrosis; necrosis and exfoliation of the anterior epithelium; loss of the endothelium covering the posterior surface; and decay of the stellate cells of the cornea which is recognized by loss of their processes, vesicular degeneration of the protoplasm, and loss of the staining property of the nucleus.

But at first, if the action of the microbe is sufficiently intense, neither migration of the leucocytes nor proliferation of the cornea cells takes place . . .

Whilst thus within the microbic area itself, and its immediate neighbourhood, only necrotic changes are to be seen, at some distance from it there appears a zone of dense infiltration of pus corpuscles, which affects more or less the entire thickness of the cornea. . . The pus corpuscles which form the ring-like infiltration of the cornea are, according to the investigations of Waller and Cohnheim, white blood corpuscles which have migrated from the vessels at the corneal margin, and have made their way towards the microbic area, without, however, quite reaching it. . . "

Another experiment is founded upon the already mentioned observation, that the purulent infiltration of the cornea takes place at a distance round the microbic area. Thus pus cells migrating from the corneal margin meet with a resistance on the part of the microbic area to their further advance.

Those who support the view that the pus cells are produced by proliferation of the corneal corpuscles, must explain this appearance by supposing that the corneal corpuscles in the neighbourhood of the microbic area perish, while at some distance from the same they are stimulated to proliferation. Which of the two views is correct can easily be shown by inoculating the microbes in two or more

*N.B.—In his Bowman Lecture, Leber does not mention what animal he experimented on in this connection.

separate places between the centre and margin of the cornea where the action of the different colonies would be accumulated. But if the purulent infiltration of the cornea depends upon the marginal emigration, then the infiltration will commence first in the neighbourhood of the corneal margin, and the separate zones of infiltration perhaps never form, because the pus cells find a great resistance to their advancement in the spaces between the single colonies.

The facts completely confirm the latter theory; for separate infiltration rings are not found, but only one common zone of infiltration near the corneal margin, surrounding all the separate colonies.

It follows from these deductions that the action of the microbes, as I have mentioned before, is not limited to the small area which they occupy, but that a kind of distant action takes place which finds its simple explanation in the diffusion of irritating substances." That irritating substances act upon the tissues of the body by diffusing through them is proved by Leber experimentally.

In view of what I have quoted above from Leber and the criticisms of his deductions preceding it, I do not feel convinced that he has been properly understood. What Collins takes Leber to mean does not appear to me to follow from what Leber says. As we have already seen, in refuting the view held by some that the pus cells originate in the corneal cells, Leber makes it clear that in every case the wound or the focus of infection does not necessarily form the centre of the circle of infiltration in the mathematical sense. Fuchs himself mentions that in some cases the formation of the ring of infiltration takes more time and that the process terminates, not in the necrosis, but in permanent opacity and flattening of the cornea. In one of his cases in which 48 hours after a perforating injury of the cornea ring infiltration was noted, the wound was thoroughly cauterized with the galvano-cautery, and the grey ring retrogressed gradually, leaving at the end of a fortnight a clear cornea but for the scar at the site of the wound. Similarly, in the instance I have described above, the infiltration disappeared completely also in the course of about a fortnight. In view of these facts, the explanation that the annulus of infiltration is not a ring of immigration to the corneal wound but to the necrotic cornea, is not quite obvious; surely, if the necrosis of the tissue were the cause of the infiltration the cases in which the whole cornea survives will have to be looked upon as instances of resuscitation of dead tissue following on the infiltration called forth by it—a by no means tenable view, which I do not think Fuchs intended to convey. For even at the time of advancing this explanation of the leucocytic immigration ring, Fuchs himself does not appear to have been altogether satisfied with it. In the latter part of the same communication—"On Ring Abscess of the Cornea"—he says, "It is conceivable that the

injurious substances which penetrate the cornea from the anterior chamber do not really harm it sufficiently to make it necrotic, but are quite sufficient to call forth the ring of immigration. In this manner are to be explained the cases with a mild course, which go on, not to suppuration, but merely to opacification and flattening of the cornea, or even to complete clearing of the cornea, as in the case of healed ring abscess mentioned at the outset. . . ." A little further on, after citing a case of melano-sarcoma of the choroid attended with high increase of intra-ocular pressure, in which pathological examination of sections of the excised eye showed absence of endothelium in the pupillary area, and a ring of infiltration in the cornea, he says: "In this instance, as in the case of the genuine ring abscess, the ring of immigration is to be attributed, not to a circumscribed lesion, as in experiments on the rabbit, but to the injury of the cornea as a whole." This statement contains an inkling of what appears to me to be the explanation of ring infiltration. Thanks to the labours of Wright, Metchnikoff, and others in the field of immunity, since the time of Leber's work on inflammation and Fuchs's publication on ring abscess, our knowledge of the processes of inflammation has been made clearer. In the light of this new knowledge, which I find already foreshadowed in the wonderfully comprehensive work of Leber when he says . . . "But the proof is not yet furnished that the microbes are harmless because they have been taken up by the cells, and that they may not, on the contrary, have been taken up because they were already killed or debilitated by other influences . . . "More recent investigations have further shown that the power of the body to kill the micro-organisms or to render them harmless, is not alone the property of the leucocytes, for it appears that the blood and other tissues or fluids possess this power in a still higher degree," and the data furnished by Fuchs's work, one is enabled to offer what appears to my mind a not unacceptable explanation of the phenomenon of ring infiltration. Essentially it is a ring of infiltration, neither to the wound nor to the necrotic cornea, but to the toxin-pervaded area of the cornea, which invariably involves the whole of this transparent structure. In the first instance the leucocytes are called forth to save the attacked tissue. But as sometimes a physician, called in at the eleventh hour to save an individual, may find on arrival that he is either unable to tide the patient over the crisis, or that the only thing left for him to do is to issue the death certificate, so it devolves often on the leucocytes in ring infiltration to deal with dead tissue. Let us first consider cases of the condition resulting from perforating wounds of the cornea. Why does the annulus of infiltration invariably occupy the same position, irrespective of the situation of the wound? Because of the cornea being an island of avascular tissue, it is inevitable. We

know that no entry of leucocytes from the anterior chamber into the cornea can take place so long as Descemet's membrane is intact. Fuchs has pointed out that he has never seen in ring-abscess the splitting into layers and destruction of Descemet's membrane, as described by Elschnig in the case of posterior abscess. Hence, we must look wholly to the limbal loops and anterior ciliary vessels for the source of the infiltrating leucocytes. In order to excite emigration of leucocytes, it is necessary that the vessel should be acted upon by the phlogogenetic agent, producing what, according to Leber, may be looked upon as a toxic paralysis of its cells and loss of tone of its wall, with consequent dilatation. Suppose the wound is situated at the periphery of the cornea. Where the wound itself forms a focus of infection—it is hardly conceivable that it does not at the outset, although at a later date sections of the excised eye may not show any germs in it—the first vessels to come under the influence of the toxin produced at the focus of infection are those in the immediate neighbourhood of the wound, and the initial infiltration occurs in the area between the wound and the nearest point of the limbus to it. The movements of the leucocytes are determined by the structure of the tissue through which they have to pass, and by chemotaxis, which directs them towards the point of greatest concentration of the toxin. Because of these determining factors, the leucocytes do not carry out any encircling manœuvre in regard to the toxin-pervaded area, but are obliged to take the shortest possible route from the point at which they leave the vessel wall to the focus of greatest concentration of the toxin. Before emigration from the rest of the circumcorneal vessels can take place, the toxin has to diffuse through the whole of the cornea and act upon them, producing the necessary changes as it comes into contact with them one after another. How soon the whole cornea becomes permeated by the toxin depends upon the rapidity of output of the toxin by the invading bacteria and its power of diffusion. The process is accelerated by the toxin entering the anterior chamber from the wound, where the wound itself forms a bacterial base, and by the toxin formed in the anterior chamber itself by the germs carried into it and multiplied there acting through the aqueous simultaneously on the whole cornea from behind. The extent to which the leucocytes can progress towards the point of greatest concentration of the toxin depends upon its virulence. As it is only in cases of marked virulence of the infection, or low vitality of the organism, or both, that the phenomenon of ring infiltration is observed, and as the infiltration is not called forth from all sides until the whole cornea is already permeated in sufficient intensity by the toxin, it follows that the leucocytes meet with strong opposition to their progress at the very outset, and are

early brought to a stop by the greater concentration of the toxin they encounter in going from the periphery towards the centre, where it cannot get diluted so easily as in the neighbourhood of the blood-vessels. When the front rank of leucocytes is arrested in its march, the succeeding ranks are obliged to mass behind it, so that a dense ring of leucocytes, instead of a diffuse infiltration, occurs. If the organism forms anti-toxins and bactericides sufficiently rapidly and the opsonic index is high, the toxins get more or less neutralized, the march of the leucocytes which had temporarily ceased is resumed, phagocytosis of the opsonised or killed bacteria occurs. The inflammatory process is stopped and the infiltration gets resorbed. Otherwise destruction of the invaded tissue occurs. In terms of warfare, the bacteria answer to the invading army, the toxins to the artillery of the invaders, the opsonins, anti-toxins, and bactericides to the artillery of the defenders, the action of the artillery preparing the way for the advance of the army—bacteria or leucocytes as the case may be—whose artillery proves superior in the combat.

Where ring infiltration of the cornea is of metastatic origin, or occurs in the course of a general acute disease of the blood, as in the case above, by the time the eye is affected, the protective mechanism of the body, where its power of resistance is sufficiently high, is already more or less vigorously active, so that, in the case of the cornea, the attack and defence may be said to be simultaneous; only because of the attack taking place on the whole cornea at the same time through the aqueous, the toxin gets concentrated in the cornea, and the attack well established by the time the leucocytes emigrating from the circumcorneal vessels have advanced a millimetre or two from the limbus, and hence the check to their further progress and the formation of the annulus of infiltration.

Now let us turn to the consideration of other forms of corneal infiltration. In the concluding part of his communication on ring abscess of the cornea Fuchs draws a detailed contrast between serpiginous ulcer and ring infiltration as follows: "It is instructive to compare with each other the two fulminant bacterial affections of the cornea, ulcus serpens and ring abscess. As regards the clinical aspect, the following differences arise: Ulcus serpens originates in superficial injuries of the cornea; the ring abscess occurs after perforating injuries, or without any injury whatever of the cornea. Ulcus serpens develops round the injured spot as its centre; the position of the ring abscess is always the same, irrespective of the situation of the injury. Ulcus serpens spreads from the centre towards the periphery, the ring abscess from the periphery towards the centre. Ulcus serpens spreads slowly and irregularly, the ring abscess very rapidly and uniformly. Ulcus serpens leads only very exceptionally, the ring abscess almost invariably, to panophthalmitis. Anatomically, the following

differences present themselves: Ulcus serpens consists in the infiltration of the margins of the small loss of substance, while the ring abscess has nothing to do with the infiltration of the margins of the wound; in ring abscess it may either be present or absent. The ring abscess is a genuine ring of immigration, which cannot be said of ulcus serpens. In cross sections of the cornea the infiltration of the margins in ulcus serpens is wedge-shaped with the apex turned towards the periphery of the cornea. The reverse is the case in ring abscess, the cross section of the immigration ring being wedge-shaped with the apex directed towards the centre of the cornea. This corresponds with the opposed direction of propagation in the two forms of infiltration. In ulcus serpens the wedge-shaped infiltration of the margins is the main bacterial base, in ring abscess the annular infiltration never contains bacteria. In both diseases necrosis of the deep lamellae of the cornea takes place. In ulcus serpens the necrosis proceeds from the anterior side, in ring abscess from the posterior side of the cornea. In ulcus serpens immigration of pus from the exudate in the anterior chamber into the hindmost layers of the cornea frequently occurs, which is not the case in ring abscess. In ulcus serpens the exudate in the anterior chamber is germ free, in ring abscess rich in bacteria. That is why in this case the suppuration spreads into the interior and leads to panophthalmitis which occurs only exceptionally in ulcus serpens, if after extensive perforation the pyogenic organisms reach the interior. The usual causal agent of ulcus serpens is the pneumococcus. It is specially this organism that is, as a rule, not found in the interior of the eye in ring abscess but various other bacteria. It appears that ring abscess, just like panophthalmitis, could be produced by different species of bacteria."

This is in essence a contrast between a disease arising from a superficial injury and one arising from a deep injury or no injury at all; between superficial spurious infiltration and deep genuine infiltration. In the one case the infiltrating cells come from the conjunctival sac, until, at any rate, a late period in the disease, and in the other case from the blood-vessels of the circumcorneal zone from the outset. Why should the infiltration in the two cases differ? In the first place the bacterial implantation in ring abscess is deep and extensive; in ulcus serpens it is superficial and minute. The course of ulcus serpens enables us to draw instructive inferences as regards the nature of the usual causal agent, the pneumococcus and its toxin. The organism does not multiply rapidly in the cornea, is slow in producing toxin. The toxin itself is incapable of quick diffusion, and of acting on the tissue of the cornea except in very high concentration. The situation of the ulcer being generally about the centre of the cornea, the toxin has

to travel about 5 to 6 mm. from where it is produced to the limbus, whereas it has only to diffuse through a thickness of about 1 mm. to reach the anterior chamber. That is why hypopyon comes early into evidence in this disease, whereas deep infiltration which depends upon the circumcorneal vessels being affected by the toxin, comes late in its course, or may not occur at all, if in the meanwhile the ulcer retrogresses. Why the ulcer in most cases starts about the centre of the cornea is probably not because superficial injuries of the cornea do not occur in parts other than the centre, but because when situated near the limbus rich in blood-vessels, the microbe is too rapidly overwhelmed to produce mischief. These inferences as regards the nature of the infiltration, the position of the ulcer, and the nature of the pneumococcus and its toxin, are supported by the fact that not infrequently one sees individuals who have been going about for years with a chronically inflamed lacrymal sac continually discharging pneumococci into the conjunctival sac, without suffering from ulcus serpens. I venture to think it is common experience to ophthalmic surgeons in industrial districts to see patients who have had a foreign body impacted in the cornea sometimes for a week or more, with infiltration around the foreign body, developing no serpiginous ulcer. Probably more cases of foreign body in the cornea are dealt with in the workshop or factory itself, where the eye is not bandaged after the removal of the foreign body and no antiseptic ointment is put in, and the workman goes back to his work immediately, than are seen in eye hospitals, and yet how few are the cases of ulcus serpens arising from them?

The next important form of infiltration that remains to be dealt with is what one sees in interstitial keratitis. In this disease, why should the deep infiltration be diffuse and slow and not annular and rapid as in ring abscess? As has been already pointed out the movements of the infiltrating leucocytes are determined by the nature of the toxin that confronts them. Although the spirochaete of syphilis, which is mainly responsible for the disease, is very resistant to the defensive mechanism of the body, just like the other very occasional causal agent, the tubercle bacillus, and hence both very persistent in their action, their toxins are, as a rule, of low virulence, so that the leucocytes find no insurmountable obstacle to their advance. This explains why the infiltration is slow and diffuse, but for points of greater density of leucocytes here and there.

Keratitis disciformis is described by Fuchs as follows: "A keratitis, which is akin to ulcus serpens, is characterized by the development of a disc-shaped grey cloudiness in the middle layers of the cornea. As a rule, in the middle of the disc one sees a more strongly clouded fleck. The periphery of the disc is sharply defined by a deeper grey border. This disc-shaped infiltrate never turns yellow

and never leads to destruction of the cornea. Only exceptionally a small loss of substance over a circumscribed area occurs. The signs of irritation are mostly not very marked; hypopyon is absent or very small. The course of the disease is prolonged, inasmuch as it takes a month or more before the eye becomes quite pale, and the infiltrate turns into a permanent opacity. . . Just as in ulcus serpens, the cause of the disease is an infection of the cornea from outside, the central deeper grey fleck representing the portal of entry of the bacteria. The epithelial lesion preceding the infection can be traced sometimes to a trivial injury and sometimes to herpes corneae febrilis, but in very many cases the cause remains unknown. . . . In keratitis disciformis the cloudiness appears uniformly grey, and only under strong magnification does it resolve itself into extremely fine, sharp, white densely placed dots. Further, the opacity is altogether sharply demarcated from the healthy cornea by the grey circular line at its border. . . ." So far as I am aware, hitherto no investigation of the pathological anatomy of this condition has been published, which is only to be expected from the fact that it never calls for excision of the cornea or eye. To my mind it appears probable that the disc of cloudiness is not due to a leucocytic infiltration at all. The microbe, being of low virulence, dies off not long after its implantation into the cornea, producing during its short life a very small quantity of toxin, so small that it gets used up in diffusing to the extent of the well-defined grey disc. Such inflammatory reaction as occurs is obviously not strong enough to call forth leucocytic emigration from the circumcorneal vessels, as evidenced by the healthy cornea between the grey disc and the limbus. In all likelihood, what occurs is either opacification of the corneal fibres that the toxin comes into direct contact with, or the precipitation of opaque insoluble substances in the interstices, from the transparent lymph permeating the corneal tissue, by chemical action. This view is in some measure supported by the fact that in "Nodular opacity of the cornea," a non-inflammatory, dystrophic condition, first described by Groenouw, Fuchs has found by anatomical investigation that the opacity is due to precipitation of insoluble acidophile and basophile substances in the cornea.

My thanks are due to Mr. Zorab, surgeon to the hospital, for permission to publish the case.

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HERPES ZOSTER AFFECTING THE CILIARY NERVES*

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HERPETIC eruptions on the sclera may occur in the course of severe attacks of herpes zoster ophthalmicus affecting the branches of the first division of the fifth nerve, including its nasal branch, and are usually associated with such changes as herpetic vesicles of the cornea, keratitis striata, "keratitis punctata," and iritis. The efflorescences take the form either of small, reddish nodules, or of larger nodules, the centre of which is transparent, or even resembles a limpid vesicle. They usually appear about a fortnight after the corneal disturbances have declared themselves, and persist for one or two months longer than the latter. They eventually clear up, leaving a slight discolouration of the sclera, and an adhesion of the overlying conjunctiva. It is important that the underlying cause, be it syphilis, influenza, or nasal or dental trouble, be treated. When the acute manifestations have subsided under fomentations and atropin, yellow ointment with dionin should be employed, with a view to clearing up the scleral nodules.

The following four cases have been met with:—

Case No. 1.—A male patient, aged 41, suffered from left herpes zoster ophthalmicus, affecting most of the branches of the first division of the fifth nerve, on the day after his nose had been forcibly washed out by a throat specialist. When seen by me, ten days later, there were signs of herpes and anaesthesia on the left side of the nose, two small erosions on the upper part of the cornea, and typical "keratitis punctata"; and three days later keratitis striata was observed for the first time. Twenty-one days after the

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patient was first examined by me, a large, raised, vascular boss, not tender, was present in the upper and inner quadrant of the sclera, in contact with the edge of the cornea. Eleven weeks later the nodule had disappeared, leaving a slight discolouration at its site. At a later period a specific history was obtained, and the Wassermann reaction was found to be positive.

Case No. 2.—A female, aged 36, was seen two months after herpes zoster on the right side of the head, with eye complications coming on a few days later. The right side of the patient's forehead was covered with post-herpetic scars; the cornea, the sensibility of which was somewhat diminished, presented the scars of an herpetic eruption, and there were two swellings, each about the size of a large split pea, in the lower half of the sclera. About one month later one of the swellings had almost disappeared, and the other was smaller.

Case No. 3.—A male, aged 66, had an attack of severe herpes on the right side, and fourteen days later cutaneous red patches in relation to the branches of the first division of the fifth nerve, including the nasal branch. The skin and the cornea were painful and tender. The lower half of the last-named was cloudy from keratitis striata and "keratitis punctata." The iris was injected. There were three reddish swellings on the sclera. All the conditions made a satisfactory, although rather slow, recovery. During the course of treatment the hypertrophied middle turbinal bodies were treated with the electric cautery.

Case No. 4.—A female, aged 57, suffered from intense pain down the left side of the nose and forehead, radiating into the left ear and back of neck; had many small red areas on the skin of the left frontal region, and oedema of the inner end of the left upper eyelid, and a large patch of conjunctival injection on the nasal side of the cornea. A week later she developed vesicles along the branches of the first division of the fifth nerve, including the nasal branch. Five months later the cornea presented three opacities (healed vesicles), and there were two small, raised, rounded, reddish patches with discoloured centres on the nasal side of the sclera, not far from the edge of the cornea. Ten months later there was only a slight discolouration of the sclera near the cornea.

ANNOTATIONS

Opticians and National Service

A case which is of considerable interest to medical men in general and to ophthalmic surgeons in particular, has been recently argued before the Appeal Tribunal in Jersey. A local paper reports the hearing

at full length, heading the account "Opticians versus Ophthalmic Surgeons." The military representative based his opposition to exemption chiefly on the ground that the optician was not employed on work of public importance, but engaged in work that was prejudicial and even detrimental to the public interest. He read a letter in support of his case from the Central Medical War Committee. The advocate on the other side, who was inclined to be abusive, and hinted that the appeal was a "put up job" of a certain ophthalmic surgeon in practice in the island, produced a letter from the Ministry of National Service, in which it was stated that it had been decided to include sight-testing opticians in the list of certified occupations, and that instructions had been issued that, pending its publication, a man of the new military age was not to be called up even for medical examination, provided that he was engaged in the occupation named below, on or after August 15, 1915. Opticians (sight-testing). "Men who have passed the examination of the Spectacle Makers' Company or of the British Optical Association, and have been regularly and habitually employed or engaged as sight-testing opticians for more than ten years."

The result of the case was that the military appeal was dismissed and the Court declined to hear the medical men concerned or even to allow them to answer the allegations made against them.

Without going into the question of whether sight-testing opticians do more harm than good, there are two points that strike us as worthy of notice:

(1) It would seem to be the sight-testing optician who is so especially favoured. The man who confines himself to his legitimate business of fitting up spectacles to prescriptions, and has not passed the examination of certain trade associations and companies, is apparently not exempt.

(2) Whatever age the man may be, if he has been regularly engaged in his business for ten years, he is exempt from being even called up for medical examination. This, contrasted with the case of the medical man, who is liable up to the age of 55, not only to be called up for medical examination, but possibly taken away from his practice which he may have carried on regularly for thirty years, is interesting. The position can only be described as grossly unjust.

The Development of the Optician

von Rohr has recently (*Klin. Monatsbl. f. Augenheilk.*, Nov.-Dec., 1917) traced the development of the optician in Germany. Before the nineteenth century there was no friction in that country between medical man and optician who kept a small shop and

usually made the glasses he sold to the public. Two factors changed the situation. The first was the divorce of ophthalmology from general medicine, and the second was the growing influence of the large wholesale spectacle makers. Cylindrical glasses, invented by Young, were employed in 1850 by C. N. Goulier, the engineer officer of Metz, and their use systematized by Donders, Knapp, v. Graefe, and v. Zehender. In 1860 it was possible to study refraction in the Universities. The greater complexity of the glasses prescribed could not fail to influence the position of the optician. The development of large spectacle factories made it unnecessary for the optician to grind his own lenses and to make his own frames. He became a middle-man between factory and patients. He was obliged to dispense the prescriptions of medical men, or to fit glasses himself. In order to do the latter, he needed some knowledge of the theory of spectacle lenses and of the commoner errors of refraction. Karl A. Burow, working with Emil Busch, the proprietor of the well known optical firm, did much to help the optician to acquire the knowledge necessary for refraction work. In America, Prentice fought to obtain a legal standing for opticians. The main reason for Prentice's success lay in the fact that most of the public wished to avoid the expense of consulting an oculist. There is no doubt that the scientific training and the examinations which are legally constituted have done much to further the better refraction work of American opticians. In England, opticians are striving for official recognition, so far, happily, without success. They have their trade journals and two organizations, the Worshipful Company of Spectacle Makers (founded in 1624) and the British Optical Association. Both of these bodies arranged examinations in 1897. The S.M.C. were advised by G. Lindsay Johnson, and v. Rohr notes that his activities in that respect were not viewed in a favourable light by his medical colleagues. It is difficult to gather the exact position held by v. Rohr himself. He says that it is obvious that every encouragement should be given to opticians to perfect themselves in their profession, always with the reservation that they should restrict their activities within reasonable bounds.

Abbreviations

Our contemporary, the *American Journal of Ophthalmology*, has adopted abbreviated titles for the names of journals most referred to in ophthalmology. It publishes such a list in its issue of August 1918. The impossible task is not attempted of endeavouring to give abbreviations for all the many hundreds of general medical periodicals, although a few are included. We notice that the

Archiv für Ophthalmologie appears in shortened form as "Graefe's Arch. f. Ophth." and we suggest that the founder's name is altogether superfluous. "Arch. f. Ophth." would be adequate. This trifling criticism does not seriously impair the value of the list and the recognition of the sound principles that underlie its construction. It may not be generally known that soon after the BRITISH JOURNAL OF OPHTHALMOLOGY was published, the editorial committee of the journal drew up a list of shortened titles of ophthalmic periodicals, which have been consistently employed in its columns since. We have not, however, published a list of the abbreviations, since enough of the name of each journal has been given to allow it to be identified with certainty. There is much to be said for standardizing all contractions of ophthalmological terms. Such a catalogue was drafted in 1884 by a committee, consisting of Mr. George Cowell, Dr. W. R. Gowers, Mr. Frederick Mason, and Mr. Edward Nettleship, at the request of the Council of the Ophthalmological Society of the United Kingdom, and was published year by year in the Society's *Transactions* until 1915, after which it was discontinued. It was found helpful by many members of the Society, more especially by those who contributed to the *Transactions*. While on this subject, we may advert to the desirability of standardizing ophthalmic terminology generally, as proposed by Mr. Percy Dunn last year in the columns of the *Medical Press*. The necessity of this reform is obvious to anybody who has occasion to read books or journals dealing with the eye. How many obsolete terms linger among us! One of the most glaring instances is "sympathetic ophthalmia," which implies an unproved theory, and another is "keratitis punctata," which is not keratitis in any sense of the word. Here is useful work indeed for a Committee of English-speaking peoples.

ABSTRACTS

I.—FACTITIOUS CONJUNCTIVITIS

(1) **Bollack, J.—Note on the existence of local eosinophilia in certain cases of factitious conjunctivitis. (Notes sur l'existence d'une éosinophilie locale au cours de certaines conjonctivites provoquées.)** *La Presse Méd.*, January 4, 1917.

(1) **Bollack** has found that the diagnosis of factitious conjunctivitis is not always readily made under the hurried conditions of examination inseparable from active service. Previous observers have not

studied the cytology of the secretion, but have examined it for bacteria and foreign bodies. Bollack has found a marked eosinophilia in a certain number of his cases. This eosinophilia appeared to bear a relation to the frequency with which the irritant used had been introduced, and was much more marked in the older cases, varying from 12 per cent. in a case in which the irritant had been used twice, to 45 per cent. in a case in which it had been introduced six times in a month. He was not able to determine whether the irritant used had much influence on the result, as in one case in which ipecacuanha was used, and in another in which insect powder was the agent, the results were very similar. Since the only affection of the conjunctiva in which eosinophilia is usually present is spring catarrh, Bollack's observation, if confirmed on further examination of a larger number of cases, should prove of considerable value. His cases were only ten in number.

E. E. H.

(2) **Monauni, C. (Ferrara).– Contribution to the study of conjunctival eosinophilia in factitious conjunctivitis. (Contributo allo studio dell' eosinophilia congiuntivale nelle congiuntiviti provocate.)** *Arch. di Ottal.*, May, 1917.

(2) **Monauni** has seen a large number of cases of factitious conjunctivitis in the military hospital at Ferrara. Some were certainly factitious and others doubtfully so. He gives a comprehensive list of the various agents, chemical and mechanical, that he has found in use and discusses the clinical features of these cases. On this point he has nothing to add that is new. He was led to the study of the cytological characters of the secretion by a paper of Bollack's (see No. 1 above) on eosinophilia in factitious conjunctivitis. He examined his cases for eosinophilia and made numerous experiments on dogs and rabbits. In neither of those animals was eosinophilia easily produced, less so in the dog than the rabbit. He was thus unable to confirm Bollack's experiment in which, after two irritations with ipecacuanha, an eosinophilia of 35 per cent. in the dog appeared. He did, however, after repeated irritations, succeed in producing a moderate amount of eosinophilia in both animals. He considers that the eosinophilia may have some connection with anaphylaxis. He sums up the results of his researches as follows:

1. Eosinophilia is very rare in the common forms of conjunctivitis, with the exception of spring catarrh, the clinical characters of which complaint are so well defined as to prevent confusion with other and especially with factitious forms of conjunctivitis.

2. Certain toxins and other complex substances of vegetable origin, and also some caustics such as nitrate of silver may produce conjunctival inflammations which have as a characteristic the presence of an eosinophile reaction in the secretion.

3. The eosinophile reaction was met with in the conjunctival secretion of several soldiers in whom it was practically certain that the inflammation had been artificially produced. He considers the reaction of great value and strongly advises that the secretion of all doubtful cases should be examined for eosinophilia.

A useful bibliography and a coloured plate accompany the paper.

E. E. H.

(3) **Tristaino, B. (Palermo).—Factitious conjunctivitis. (Sulle congiuntiviti provocate.)** *Arch. di Ottal.*, February, 1917.

(3) **Tristaino** describes the various forms of factitious conjunctivitis met with in Italy. He divides the cases into three main groups: 1. Mechanical stimuli: abrasions and linear wounds. 2. Caustics: lime, alum, corrosive sublimate, etc. 3. Irritating substances: cigar ash, tobacco powder or juice, soap, urine, ipecacuanha, dust from horse's curry comb, castor beans, etc. He says that various parts of the country have generally some special mysterious compound for the purpose. In addition to such artificial methods of setting up inflammation, deliberate infection with blennorrhagic or trachomatous material is practised with disastrous results.

In the first or mechanical group the simulation is usually that of one or other stage of trachoma. To imitate the first stage the everted lid is vigorously rubbed with a piece of rough cloth. To imitate later stages of a recurrence of trachoma in an old case the lid is everted and scars are made on the palpebral conjunctiva with a pin point. After the scars have formed some means of setting up irritation are used. Diagnosis of either should present little difficulty. In the first variety the absence of involvement of the fornix or bulbar conjunctiva, the presence of papillae without typical granulations, and the scanty nature of the secretion gives a very different picture from that of an early acute trachoma. It is also often possible to detect punctiform haemorrhages on the palpebral conjunctiva after eversion of the lid. The second variety presents even less difficulty. The regular clean-cut scars and the absence of any involvement of the fornix are quite sufficient for the exclusion of a genuine late trachoma.

In the second group, in which some caustic agent has been employed, a superficial resemblance to Weeks's conjunctivitis is sometimes produced owing to the presence of punctiform haemorrhages. These, however, are less extensive than in the genuine disease and tend to be confined to the lower segment of the conjunctiva.

In the third group, in which some irritating substance is made use of, powdered ipecacuanha figures most frequently. Numerous accounts of the results of the use of this drug have already appeared. The earliest symptoms are those of an intense irritation

with marked swelling of the lids. One eye, and that the right, is usually affected. There is little secretion, although a pseudo-membrane may form on the conjunctiva. The skin of the lids is eczematous in various degree. The conjunctiva is markedly inflamed and of a pale red, specially in the lower *cul-de-sac*. In more inveterate forms the colour tends more to a grey. It is characteristic of the complaint that the conjunctival changes remain localized to the place where the powder has rested; in later cases, even though the inflammation has become more generalized, it is always most intense at this part. No matter how severe the conjunctival affection may be, the cornea always escapes. It is noteworthy how easily a violent reaction is set up in an eye that has suffered from this complaint by the use of even slightly caustic lotions, or the mechanical stimulus of everting the lid. Experiments have shown that the irritation is not mechanical, but due to the chemical action of emetin.

Tristaino enters in some detail into the action of two other irritating substances that are frequently employed: one the material derived from the horse's curry comb, which contains epidermal desquamations and numerous cocci, the other the seeds of the castor oil plant. The former variety of conjunctivitis has the appearance of a severe acute catarrhal ophthalmia, with an abundant, whitish, stringy secretion. A pseudo-membrane forms readily, and the bulbar conjunctiva shares in the process, becoming markedly chemotic. Two triangular, yellowish masses appear frequently on each side of the limbus. The cornea is seldom attacked. The fact that the affection, in spite of its severity, is practically always confined to one eye should excite suspicion as to its origin.

The action of the castor seed is believed to be due to an enzyme. Different eyes react with varying intensity. In some the inflammation and abundant secretion may appear like a gonorrhoeal ophthalmia. Extreme hypertrophy of the papillae makes its appearance, the bulbar conjunctiva becomes chemotic, and a dirty white delicate pseudo-membrane is formed. Rarely a small ulcer may appear on the cornea, but this structure usually remains unaffected.

As regards treatment, this follows the usual lines. Silver salts should never be used in the early period or in the presence of a pseudo-membrane. In cases caused by any caustic substance Tristaino has found that an ointment containing picric acid up to 2 per cent. is of great use. He has also found it serviceable in the more purulent type used as a collyrium.

E. E. H.

(4) **Rasquin, E.—Factitious conjunctivitis. (Conjonctivite provoquée.)** *Arch. Méd. belges*, April, 1917.

(4) **Rasquin** finds no adequate description of the conjunctivitis artificially produced to avoid military service. In this paper he describes the various points that he has found, in his capacity as military surgeon, of value in differentiating the artificial from the genuine article. These are as follows: 1. The affection is almost always unilateral, since the soldier does not desire to make himself more uncomfortable than necessary for the attainment of his purpose. 2. Objective signs in the mucous membrane are largely limited to the inferior *cul-de-sac*. In some more severe cases there is some reddening of the superior *cul-de-sac*, but the instillation of a drop of adrenalin and cocain will readily bleach this while leaving the lower artificially inflamed conjunctiva practically unchanged. 3. Bacteriological examination of the secretion shows nothing beyond the normal flora of the conjunctival sac, while microscopical examination may reveal the causative agent. In one case Rasquin was able to identify a greasy substance, probably soap, with the aid of osmic acid staining. 4. The means used for producing the irritation may be found in a purse, watch cover, etc. 5. Occlusion of the eye after cleansing will cause rapid improvement in the factitious variety, the reverse being the case in true conjunctivitis.

E. E. H.

II—DETECTION OF SIMULATED BLINDNESS

(1) **Dunn, Percy (London).—Simulated blindness, the detection of.** *Med. Press and Circular*, April 24-May 1, 1918, *and West London Med. Journal*, January 1, 1918.

(1) In this paper, read at the December meeting of the West London Medico-Chirurgical Society, Dunn traverses the main features of the detection of ocular malingering where the exaggeration of a real visual defect is concerned. He points out that the ophthalmic surgeon is required to put forth his best powers of patience, sagacity, and knowledge in order to circumvent the imposture, adding "it may be said that were an intelligent malingerer to be carefully coached in all the various ways of exposing his fraud, to learn the pitfalls into which it is the purpose of the tests to precipitate him, and educate himself so as to avoid falling into the traps so wilily prepared for his discomfiture, the task of the ophthalmic surgeon of proving the fraud, would be well-nigh impossible." Tactfulness, patience, and an entire absence of hostility of demeanour are essential factors in the examination of

these cases. An important point for the time being is to gain the man's confidence; by this means he is taken off his guard, and inveigled into weakening the defence of his deception. In the description of the methodical examination of the eyes, stress is laid upon the value of the pupillary reflexes, and the importance of charting the fields of vision in cases of soldiers suffering from shell-shock, or wounds of the occipital region, in which complaint is made of visual disturbance. Again, the point is emphasized that it is impossible for any one with visual capacity to simulate correctly, and successfully, the movements of real blindness. A malingerer, suddenly called upon to give an unrehearsed display of "blindness" in an eye, presents a picture, easily distinguishable as a parody upon blindness as portrayed by the blind. "Especially so is this the case with uncultured persons relying upon the conviction that, having once maintained blindness in an eye, it is impossible for any one to compel them to admit that they see with it." That conviction, however, necessarily takes no account of the fact that the eye is ***par excellence*** the organ of deception, the faculty possessed by the eye upon which the ophthalmic surgeon relies in his task of exposing a fraud. Such uncultured persons readily fall victims to the tests with spheres, prisms, and coloured glass and letters, to which attention is drawn in the paper. On the other hand, the intelligent artist in malingering, fortified, it may be, in the prosecution of his fraud by the experience gained from repeated examinations, may for some time maintain a pertinacious resistance against his exposure. Such artists, however, Dunn points out, are mostly to be found among continental nations, enslaved by the law of military conscription. These artists are almost unknown in this country. Hence it is, that in English ophthalmic text-books, the subject of malingering is generally dismissed in a few paragraphs, whereas, after all, "the subject is a large one, worthy of a monograph by an English author, because of its interest, because of its close bearing upon diseased conditions of the eye, a full knowledge of which is essential to establish a supremacy against the possibility of judging wrongly, and because of the scattered literature, recorded in foreign journals, embracing the experience of those who have seen much of its practice."

S. S.

(2) **Jellett, J. W. H. (Waterford).—Simulated blindness, the detection of.** *Med. Press and Circular*, May 29, 1918.

(2) In commenting upon Dunn's paper, with reference to the "Friend" test, **Jellett** refers to the modifications he has introduced in order to render the test more trustworthy. This modification consists in being able to vary the colour of the letters from red to green and vice versa at will, thus causing it to be more confusing to a malingerer. He insists, when the ordinary "Friend" test

is being used, that it is absolutely essential that the person under examination should not know which coloured glasses are over the right and left eye respectively, otherwise an astute malingerer will be able to defeat the examiner. In Jellett's modification the change in colour of the letters can be effected rapidly and without the patient's knowledge.

S. S.

III.—THE INTRA-OCULAR PRESSURE AND THE STATE OF THE BLOOD

Hertel, E. (Strassburg). — Clinical reseaches on the dependence of the intra-ocular pressure upon the state of the blood. (Klinische Untersuchungen über die Abhängigkeit des Augendrucks von der Blutbeschaffenheit.) *Arch. f. Ophthal.*, Vol. XC., 1915.

In a previously published work, **Hertel** reported a series of experiments on rabbits to show the changes which it was possible to produce on the intra-ocular tension by an alteration in the composition of the blood, independently of variations in the blood pressure. Here he gives an account of observations on the human subject on similar lines. He shows that on the administration of large doses of sodium chloride by the mouth to healthy persons, the tension of the eye is quickly, though only temporarily, reduced while the molecular concentration of the blood is raised. This result is more rapidly attained by the use of intravenous injections of 5-10 per cent. salt solution. The latter method was employed even in persons of advanced age and in the great majority of cases was well tolerated, with little or no inconvenience except a feeling of thirst. He also proved its efficacy in reducing the tension in a considerable number of cases of glaucoma. These results were exactly parallel to those obtained in his experiments on animals.

In the case of the latter, too, Hertel was able by the use of water or very weak solutions of salt and sugar, to make a considerable reduction in the concentration of the blood and thereby raise the intra-ocular tension; and even where he had induced hypotony by increasing the concentration of the blood, the tension was quickly restored to normal by the intravenous injection of physiological salt solution. In the human subject, however, it was found impossible to raise the tension by the administration of large quantities of water by the mouth, apparently for the reason that the water was excreted too quickly to produce a sufficent change in the blood: intravenous injections of water were considered too dangerous, because of its

haemolytic action and were therefore not tried. But in two cases of diabetic coma with hypotony, the condition of the blood was improved, and a marked rise in the tension effected by the drinking of water and the intravenous injection of physiological salt solution with bicarbonate of soda.

It is thus shown that in man, as in the lower animals, the normal tension of the eye, as well as the conditions of increased and diminished tension can be greatly altered by a change in the constitution of the blood. This fact suggests the inference that to have a constant intra-ocular tension the constitution of the blood must be kept constant, and prompts the hypothesis that certain pathological changes in the former may perhaps be due to some disturbance in the latter.

As regards the hypotony found in diabetic coma such an hypothesis, in Hertel's opinion, holds good, the increase in the concentration of the blood which he produced experimentally by the administration of salt and sugar corresponding in this case with the rise in the concentration through the presence of sugar and acetone bodies in the blood. He does not believe that the fall in tension is due to the specific action of salts of butyric acid, as was formerly held by certain writers, because he obtained in his experiments a similar fall by the use of numerous other substances; nor does he accept the theory of the presence of a constituent in the serum having a special action on the ocular tension, for his experiments showed that a fall in tension can be effected, not only by human serum, but also by albumins from other sources.

In order to test the hypothesis in relation to increased tension, he investigated the condition of the blood in cases of glaucoma. For this purpose, he did not choose elderly patients, because the majority of them exhibit signs of disease in the vascular system, kidneys, etc., which not infrequently leads to a change in the concentration of the blood and, on the other hand, has been interpreted in different ways in relation to the aetiology of glaucoma. To avoid this disturbing element, he took young subjects without organic disease, and contrasted them with patients showing well-marked cardiac and renal affections or diabetes in whom there was no increase of intra-ocular tension. Tables are given showing in each class respectively the tension, blood pressure, molecular concentration, and percentage of albumin in the serum. A comparison of the two groups shows that there was no relation between the blood pressure and the ocular tension—in the glaucoma group, the tension was high, while the average blood pressure was within normal limits.

In this group, moreover, the average molecular concentration was slightly subnormal, while the albumin content was close to the lowest normal limit. This was in marked contrast to the other group, in which the conditions were in every respect reversed. In

the case of the glaucoma group, the variation from the normal values was not very marked, but the tendency to a thinning of the blood, as shown by the low molecular concentration, is perhaps not without importance, and its significance in relation to the increased tension is to some extent confirmed by the work of another writer on the viscosity of the blood in glaucoma.

The number of cases Hertel has examined in this way is as yet small, but he is of opinion that further research on the same lines, coupled with the results already obtained by experiments and in diabetic coma, will prove that the fall in the concentration of the blood is a predisposing factor to the rise in tension.

He shows by some examples, the practical value of the infusion of hypertonic salt solutions in cases of glaucoma, mostly of acute or subacute type. The effect is only temporary: he has limited its use to obtaining a rapid reduction in the tension in order to improve the conditions for subsequent operation or to cases where operation is refused.

In glaucoma simplex, the same method of treatment has been employed, but the number of cases thus treated is as yet too small to admit a publication of the results.

THOMAS SNOWBALL.

IV.—THE PREVENTION OF ACCIDENTS

(1) **Davie, H. W.—Eye protection for grinders and machinists.** *Ophthalmic Record*, October, 1915.

(1) **Davie** draws attention to the necessity for grinders and machinists to wear protecting goggles at work, and the difficulties and prejudices which have had to be overcome in getting the men to wear them. At the present time the objections have been overcome (in America) and improvements have been designed which yield perfect comfort as well as complete protection for the wearer. A heavy type of goggle is unnecessary for grinders, but side guards of wire or leather should be provided. Grinders of manganese or high-carbon steels should also be protected from glare as well as from grit. Light amber-coloured lenses are recommended for this purpose, and the use of an anti-sweat pencil will obviate clouding of the lenses. Chippers should have heavier glasses, and when it is necessary to wear correction, the protectors should be worn over the more expensive correction lenses. Davie states that it is an easy matter to get the men to wear protectors when the advantages thereof are explained to them.

J. JAMESON EVANS.

(2) **Lewis, F. Park (Buffalo).—Accidents and injuries of the eye—their prevention and treatment.** *New York State Jl. of Medicine*, May, 1916.

(2) This somewhat lengthened communication by **Lewis**, is addressed rather to the general practitioner of medicine than to the eye specialist, and so is scarcely suitable for abstract in our columns. He challenges the common belief, even of surgeons, namely, that a large proportion of the accidents to the eyes cannot be avoided. Upon this point Lewis quotes the views of the officials of compensations commissions, the managers of large industries, as the Gould Coupler Works, the Pierce-Arrow Motor Car Co., and ophthalmic surgeons. One authority estimates that fifty per cent. of the eyes lost by accidents could have been avoided had the applicants for compensation worn goggles. Lewis believes that the greatest danger from the neglect of protective appliances is met with in the more modest plants, since they have not yet realized that the expenditure of a small amount of money in seeing that the plant is well equipped with protective devices is good business. Among common methods whereby accidents occur from molten metal, Lewis enumerates: (1) The paths along which the metal must be carried are narrower than those enjoined by law, *viz.*, a width of at least eighteen inches; (2) pouring the hot metal into moulds in which some water has gathered; and (3) the sudden condensation of the atmosphere in the foundry causing a thick, blinding vapour, due to admitting cold air at the time the metal is to be poured. S. S.

OBITUARY

A Nestor of ophthalmology, Robert Brudenell Carter, died on October 24, a few weeks after reaching his ninetieth birthday. He was born at Little Wittenham, Berks, and was the son of Thomas Carter, Major R.M. His mother died in giving him birth, and, as not uncommon under such circumstances, Major Carter abandoned all interest in his son; so that the child owed his christening, and indeed his name, to a family friend, the sixth Earl of Cardigan, the father of Lord Cardigan of Light Brigade fame. He was educated at the London Hospital after an apprenticeship to a practitioner of medicine. Carter had an eventful life. Soon after qualification, in 1852, he went into general practice in the North of London; but two years later, when England and France declared war against Russia, he joined the Turkish Army as staff surgeon, and eventually

received the English and Turkish medals. In the Crimea he became acquainted with Sir W. H. Russell, the famous *Times* correspondent, and was induced by him to furnish to that periodical a series of graphic letters describing his experiences. His letters to *The Times* attracted much attention, and had no slight bearing upon his future career. On his return to this country he again went into practice in suburban London, and then migrated to Nottingham, where he was instrumental in founding the Nottingham and Midland Eye Infirmary. Whilst engaged in doing this, he approached a medical colleague, known to the writer of this notice, asked him to support the scheme, and suggested that he should join the medical staff of the new infirmary. "But," replied the latter, "I know nothing of eye work." "Neither do I," was the answer, "and that is precisely the reason I am founding an eye infirmary." Carter then devoted himself to the practice of ophthalmology in Nottingham. In 1862 Carter left the lace metropolis and went into partnership in Stroud, and played a prominent part in founding the Gloucestershire Eye Institution. In 1868, then being forty years of age, he settled in London as an ophthalmic surgeon, but before taking this step wisely re-opened his connection with *The Times*. He was soon elected surgeon to the Royal Eye Hospital (to give that institution its modern name). In 1870 he was appointed ophthalmic surgeon to St. George's Hospital, a post he retained for twenty-three years, when he was made consulting ophthalmic surgeon. From 1887 to 1900 he represented the Society of Apothecaries on the General Medical Council, and did much useful work on that body. In 1881-82 he was Hunterian Professor of Pathology and Surgery at the Royal College of Surgeons. He was Lettsomian Lecturer, Orator, and President of the Medical Society of London (1886). It was but fitting that at the last meeting of that Society (October 28), a vote of condolence with Mr. Carter's relatives was passed by the Fellows. From 1889 to 1892 he represented West Islington on the London County Council. He was a Knight of Justice and Honorary Commander of the Order of St. John of Jerusalem, and consulting ophthalmic surgeon to the British Ophthalmic Hospital at Jerusalem connected with the Order.

Carter's contributions to medical literature were numerous and important, and not confined to ophthalmology alone. He was deeply versed in French and German. He translated from German Zander's *Der Augenspiegel* (1862) and Scheffler's *Die Theorie der Augenfehler und der Brille* (1868). He wrote "Hints on Diagnosis of Eye Diseases" (1865), "A Practical Treatise on Diseases of the Eye" (1875), and, conjointly with Mr. W. Adams Frost, "Ophthalmic Surgery" (1887). His writing was distinguished by conspicuous clearness. He delighted in rounded periods and well balanced sentences. He had a gift of keen and incisive oratory.

He retired from the active practice of his profession in 1903 to South Side, Clapham Common, where he died.

Mr. Carter was twice married, and by his first wife had four sons.

The following has been contributed by Mr. W. Adams Frost, for many years Carter's colleague at St. George's Hospital:

Robert Brudenell Carter was not merely an ophthalmic surgeon. His interests were varied and extensive. He was well known to the public by his signed contributions to *The Times* on professional subjects in which they were directly interested, but he also wrote leading articles, which were of course anonymous, on numerous scientific, social, and educational subjects. He also wrote a paper on the constituents of London dust and its effect on health, and advocated the substitution of parquet flooring for carpets, and the abolition, as far as possible, of curtains and window blinds; the somewhat austere appearance of his own house testified to his conscientious carrying out of these recommendations. His paper entitled "The Artificial Production of Stupidity in Schools" might still be read with profit by our educational authorities. He was always a strenuous opponent of the so-called "system" of homoeopathy, and his lengthened correspondence with the late Lord Grimthorpe on this subject in *The Times* will be remembered.

He was for some years in general practice in the provinces, and this fact had a noticeable effect on his subsequent career as an ophthalmic surgeon, leading him always to pay considerable attention to the patient's general condition, and as he kept himself well informed on modern therapeutics, it was certainly of benefit to his patients.

His clinical teaching also was rather more suited to advanced than third and fourth year students, for he generally assumed a knowledge in his hearers which they did not always possess. The same may also be said of his systematic lectures, but these were never dull; they were delivered without notes, couched in good language, and frequently relieved by touches of humour, generally in a somewhat sarcastic vein.

As an operator he was probably unsurpassed. He was absolutely ambidextrous, and was apt to refer to some others as "ambi-sinistrous." He has also been heard to say that he never knew how difficult the operation for squint was till he saw so-and-so trying to perform it.

He was a fluent speaker, but as an orator he, perhaps, lacked animation. It has been remarked that his speeches, with their even flow of language, resembled a leading article in *The Times* well read. He had perfect self-control, and generally carried his audience with

him; but he appeared to be indifferent to the effect he produced on them. Many will remember the great meeting in the theatre of the College of Surgeons, at which a large number of members agitated for more control over the affairs of the College. Carter, who was on the council, was put up to oppose the motion. No advocate could better have supported a hopeless cause. He was at first listened to with attention, then he made a remark, the exact nature of which the writer has forgotten, which lashed what had been his audience to fury. He stood perfectly still, with an amused smile on his face, as if he were watching the antics of a cage of monkeys. When the uproar had subsided, he repeated the remark with increased emphasis, but the effervescence had subsided, and he was heard quietly to the end.

His ready sarcasm, which he was not always careful to suppress, gained him some enemies, and gave a wrong impression of his real character. To those who knew him well he was a delightful companion, full of anecdotes which he could relate in an inimitable manner. He was a kind, sympathetic, and helpful friend, and he will be missed by a large circle.

After he retired from practice his bodily strength gradually diminished, but his mental vigour was but little impaired, and up to a short time before his death he continued to write. The writer was privileged to see him on his ninetieth birthday. Although his voice was weak he conversed freely on the war and other current topics.

We regret to announce the death of A. H. Payan Dawnay, at the age of 48 years, on November 8, from pneumonia following influenza. He was the eldest son of Sir Archibald D. Dawnay, of London and Cardiff. He held the appointment of ophthalmic surgeon to the Great Northern Hospital, and of surgeon to the Western Ophthalmic Hospital.

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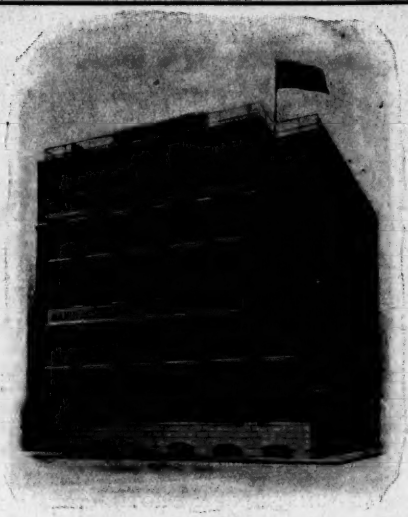

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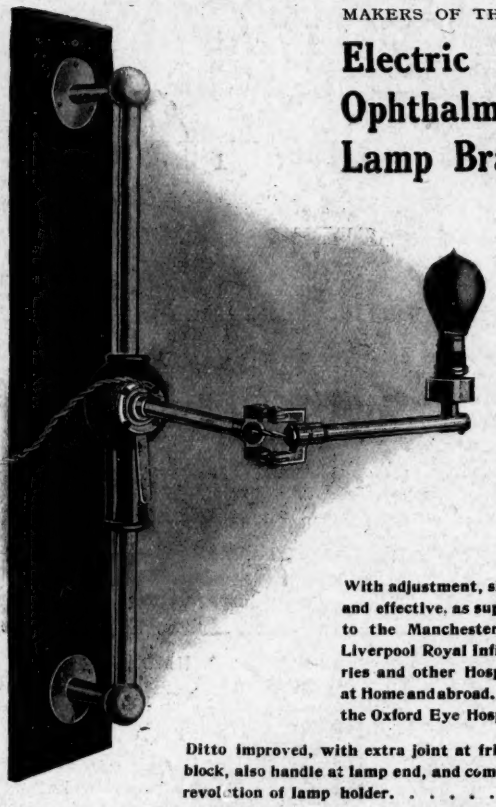

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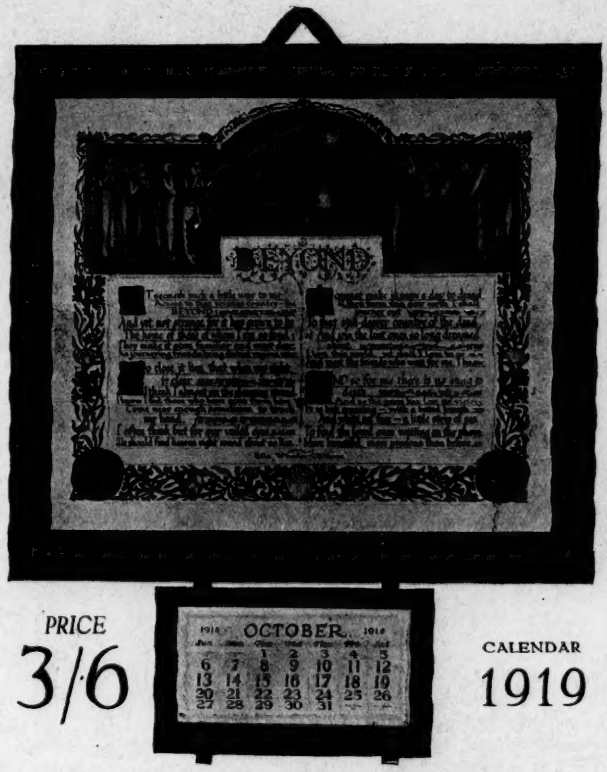

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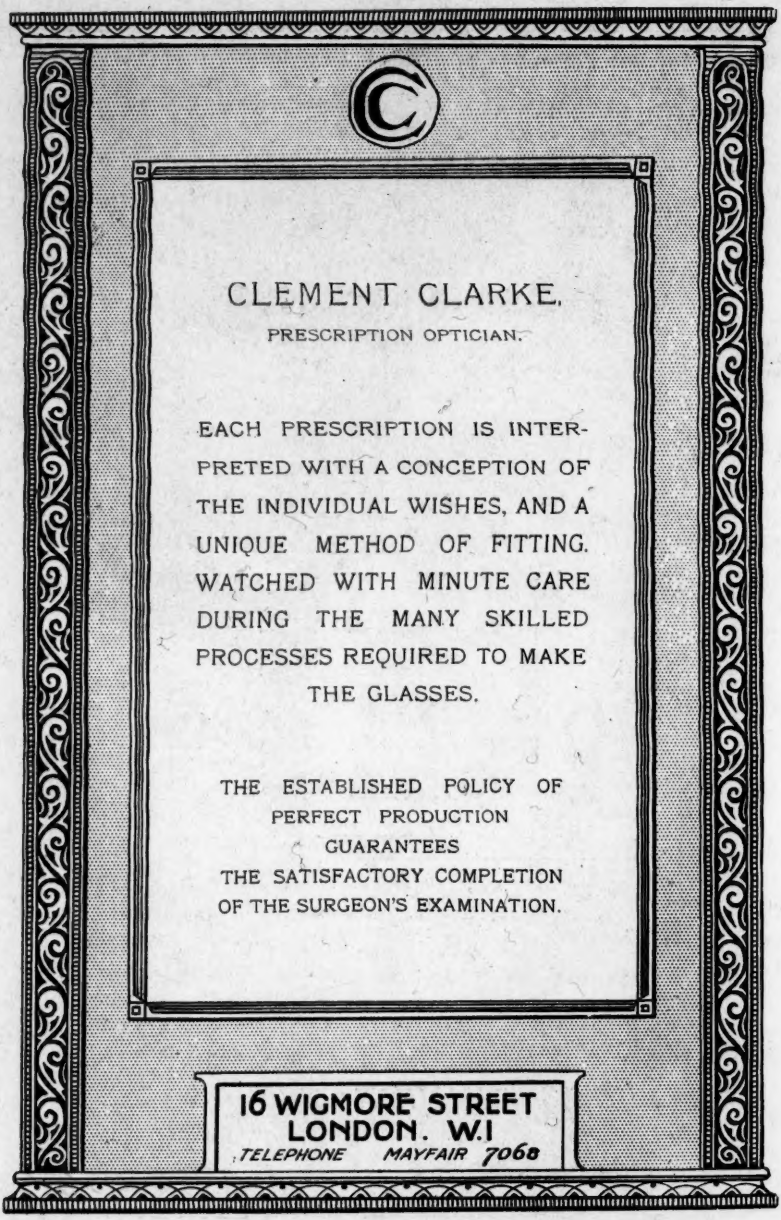
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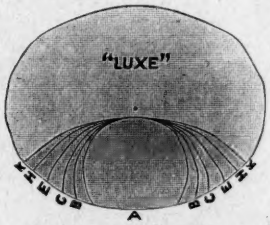

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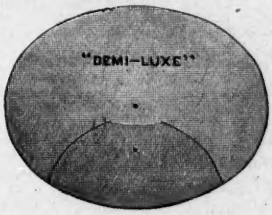

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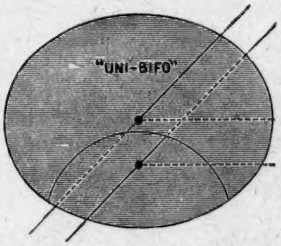

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